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FOOD MANUFACTURE

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FOOD MANUFACTURE

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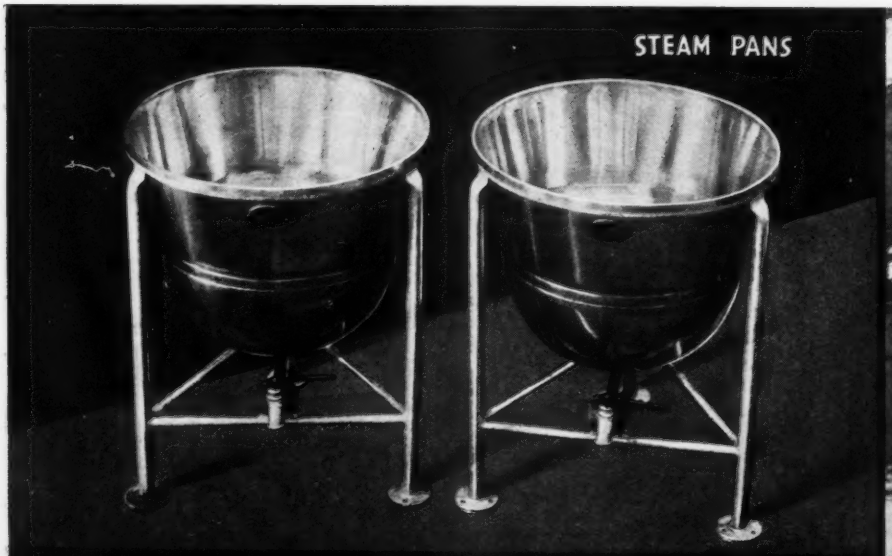
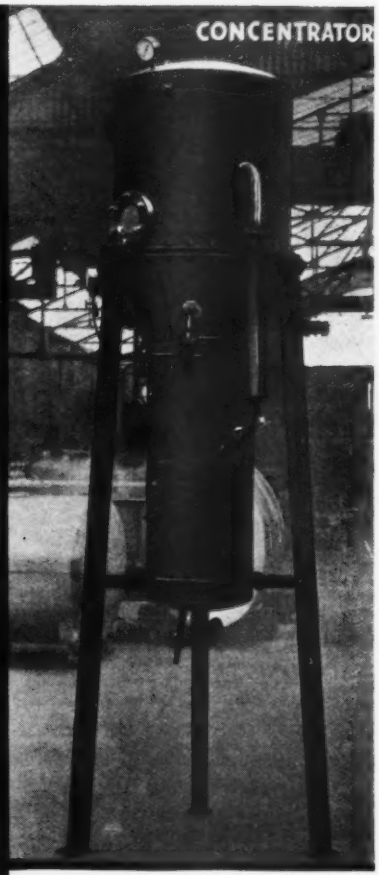
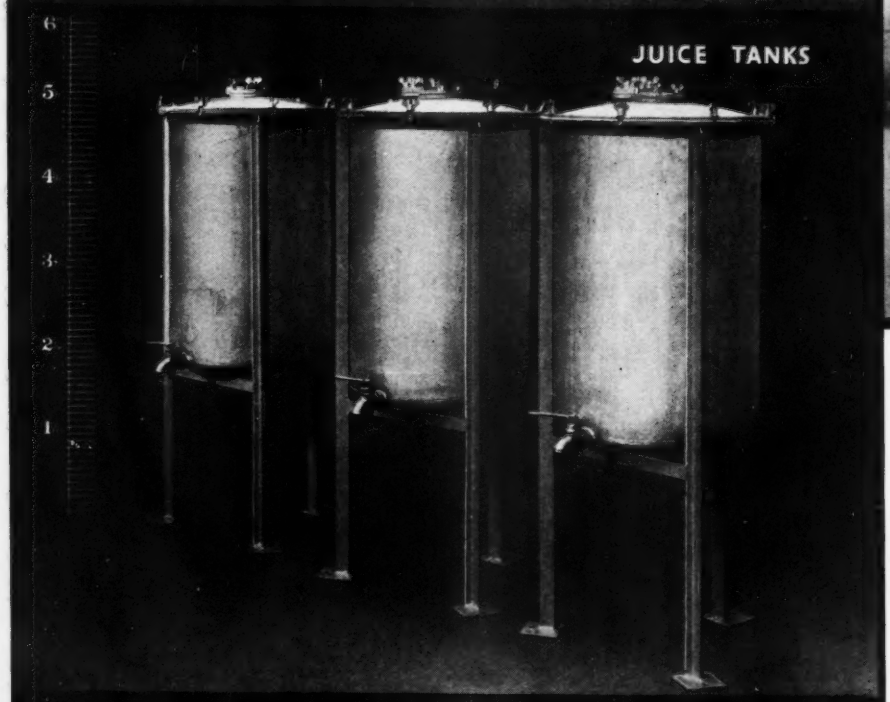
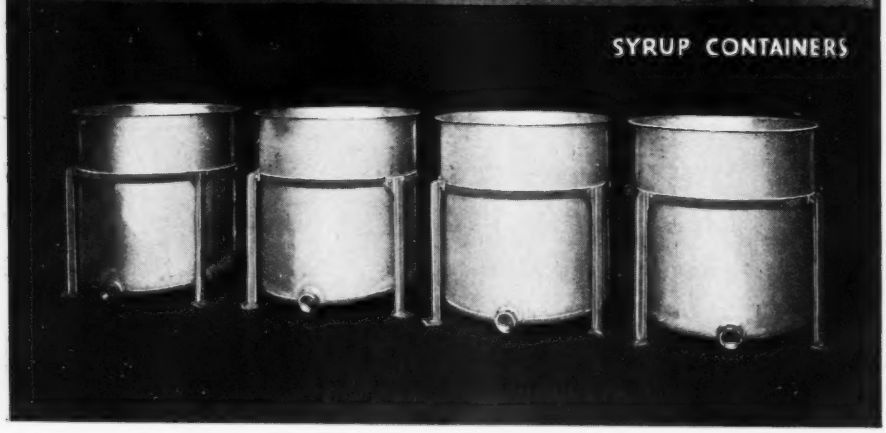
STAINLESS STEEL PLANT









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FOOD MANUFACTURE

Vol. XI, No. 1 **January, 1936**

The Food Group in Manchester

ONE COULD scarcely conceive of a scientific meeting more interesting, and also more instructive, not only to the food technologist, but to the general student of science, too, than the one which was held in Manchester on December 6, under the joint auspices of the Food Group of the Society of Chemical Industry, the Manchester Section of that Society, and the local members of the Chemical Society. No doubt the singular success of the occasion was not altogether due to the nature of the subject and the happy choice of its exponents; some credit must be given the efficient manner in which the arrangements were carried out, largely ascribable to a strict insistence on the observance of time limits. Both Mr. McCulloch, who was chairman of the evening session, and Dr. Lampitt, who officiated in the afternoon, brought down the "guillotine" on more than one occasion, but it had the effect of giving each speaker a fair share of the total time available, and of speeding up and of evenly distributing the discussion. There is no doubt that a ruthless exercise of the "guillotine" at meetings of this sort has a beneficial, and also a stimulating, effect.

Micro-Organisms and Foodstuffs

Actually, this meeting was a symposium on micro-organisms in relation to foodstuffs, the first half of which was devoted to a general review of the recent developments in the chemistry of moulds and bacteria, while the rest of the proceedings was given over to a consideration of the application of this knowledge in industrial practice, as illustrated by three departments of food manufacture concerned with fruit, milk, and bread.

This arrangement, a very wise one in fact, had the desired effect of avoiding the danger of scattering over a wide, one might say limitless, field the vast resources with which this subject of micro-organisms in relation to foodstuffs is invested. At the same time, it provided adequate material with which to illustrate both general principles and the potentialities for further useful lines of investigation held out to scientific workers in this field of endeavour.

Dr. Lampitt himself opened the symposium by reminding us of the importance of micro-organisms in everyday life and in industry—particularly in the food industry. This he contrasted with the earlier interest which was largely confined to the medical side. He also stressed the increasingly chemical bias which the march of events has given to bacteriological studies.

French Bread

In our Editorial Comments for August this year we referred to the poor quality of bread in France. Recently the wretched quality of French bread was again discussed at a meeting of the Academy of Medicine. At this meeting the Bread Commission presented a report which did not beat about the bush, but spoke very plainly on the subject. The Commission pointed out that while the farmers are organised in one trade union, the millers in another, and the bakers in yet a third, there is no such thing as a bread eaters' trade union! This, it was stated, is a pity, not only for the unorganised bread eaters, but also for the said farmers, millers, and bakers, who have long suffered from an unofficial strike of bread eaters, carried on more or less unconsciously. In an attempt to improve things the Confédération des Syndicates Médicaux joined with the Bakers' Union for the sale of "bon pain" made of exclusively French flour containing 11 to 12 per cent. of dry gluten. In each *arrondissement* of Paris one baker's shop has been selected for the sale of this bread. As flour made exclusively from French wheat would scarcely contain such a high proportion of dry gluten, the bread made from it would contain much less, and it would appear that gluten from some other source will have to be added. Possibly some of the home-produced surplus will be utilised for providing the gluten necessary, instead of selling it abroad at very low prices.

Biochemistry of Moulds

Dr. P. W. Clutterbuck, O.B.E., D.Sc., F.I.C., surveyed the recent work done on the biochemistry of moulds, a task for which he is well qualified, considering his association with Professor Raistrick, F.R.S., in the brilliant researches carried out at the London School of Hygiene and Tropical Medicine. It has been a matter of considerable surprise to most people, even among those who are concerned with the study of moulds, to find, as a result of these researches, how wonderfully fertile are the moulds in their powers of synthesising organic compounds of great complexity, some of which are difficult, if not impossible, to synthesise by ordinary chemical means. So far, in these investigations, the medium in which cultivation has been carried out has been a standardised preparation of glucose. Moreover, other conditions have been standardised, and when one considers the possible variations, not only in the composition of the medium, but also in other factors, such as temperature, *p*H, and pressure, and when one recollects that there are hundreds of thousands of types of moulds, one feels justified in anticipating that future work on the Raistrick lines will yield many more results of extraordinary interest and importance.

Moulds in Industry

In consideration of the fact that the study of the metabolism of mould growth is a highly specialised one, and consequently very few people have more than a general acquaintance with it, Dr. Clutterbuck prefaced the main body of his address by an outline sketch of the subject. He referred to the morphology, classification, general physiology, and applications of fungi (which are popularly known as moulds) to industry, such as, for example, in the manufacture of citric acid, pyrogallic acid, ergosterol, enzyme preparations, and in cheese ripening, alcoholic fermentation, and the production of soya sauce. An interesting recent application of moulds is as an indicator of the nutrient values of soils. As an illustration of the extent to which moulds are used in industry, the lecturer stated that it had been estimated that at one citric acid factory in America the equivalent of nine acres of mould were employed in the process of manufacture.

Biochemistry of Bacteria

Dr. T. K. Walker, D.Sc., F.I.C., of the Fermentation Department of Manchester University, then took up the story of the chemical activities of bacteria, and in an address of singular interest, although, it must be admitted, the subject was exceedingly intricate from the layman's viewpoint, he outlined the latest theories that had been put forward by authorities in Germany, England, Holland, and America in an attempt to provide an explanation of the chemical mechanism of bacterial metabolism involved in processes of industrial importance, such as alcoholic fermentation. Dr. Walker drew attention to the two main schools of interest, the Continental school, which was concentrating its attention on the details of mechanism, and the one in this country, which was more concerned with a study of the products of metabolism.

Mould Spoilage of Fruit

After dinner, which was held at the Engineers' Club, the evening session was opened by Dr. R. G. Tompkins, Scientific Officer at the Low Temperature Research Station, Cambridge, with an account of the present position reached by the researches into the problems associated with the mould growth on fruit, which is, for example, responsible for the destruction of 2 to 3 per cent. of Britain's import of twenty million cases of oranges. He stated the scientific aspect of the problem with commendable clarity, and disentangled the main factors involved. One of these was the wounding of the fruit caused by handling, which increased its susceptibility to infection by mould spores. Dr. Tompkins supported this general statement by citing the results of controlled experiments which he had carried out. He also dealt with other factors which played their part in determining the degree of susceptibility to infection, such as temperature and humidity of storage, although the former is limited by the fact that too great a reduction in temperature is attended by other types of injury to the fruit.

A good deal of discussion took place on the possibility of various treatments that destroyed or inhibited the growth of spores on oranges. Dr. Tompkins agreed that such treatments were possible, and he discussed various considerations which were bound up with the practice of wrapping fruit in specially treated paper, and of storing fruit during shipment in gases such as ammonia.

Milk and Bread

Miss A. A. Nichols, M.Sc., Bacteriologist to the Hannah Dairy Research Institute, Ayrshire, gave an excellent paper describing the various agents, chiefly bacteriological, which were likely to give rise to defects in canned milk products, such as condensed milk and cream, and the precautions

which should be observed in order to avoid these defects. This was a very interesting and instructive paper.

The final paper was given by Mr. C. H. Fuller, M.Sc., F.I.C., of the Research Staff of Messrs. J. Lyons and Co., Ltd. Mr. Fuller reviewed the part played by micro-organisms in breadmaking and in the after-life of the bread—that is to say, when it has left the bakery. This, of course, brought in the problem of bread wrapping, and on the advisability of this Mr. Fuller expressed doubts, unless it could be arranged to provide efficient ventilation for the wrapped loaf—a very difficult matter in practice. Otherwise, conditions of high humidity were likely to favour the growth of moulds. Another interesting point which came up for lively discussion was that of bread flavour. Nobody had any clear idea as to what exactly is meant by an attractive "bread flavour", or to what particular compounds it may be ascribed, but this is not surprising when one thinks about it.

Soybean Meeting

The American Soybean Association held its annual meeting at Evansville and Lafayette, in Indiana, during the latter part of August. Evansville is the centre of the black soybean seed producing area in Indiana, while Lafayette is located in the Wabash Valley, where the yellow soybean is extensively grown. Features of special interest were the plots given over to research, and demonstrations and exhibits of products manufactured from soybeans and the plant used in the manufacturing processes.

It is stated that the use of soya flour, as made by American manufacturers, is principally in the manufacture of sausage, dog food, and other meat products. The flour is also used in bakery goods, and is a valuable addition to the diet, as it counterbalances any tendency to dietetic acidity.

The Association further states that, "since soya flour differs essentially from wheat and rye flour, it is necessary to develop a special technique and special formula for soya bread. The main objective is to obtain a correct texture, volume, and taste. The incorporation of soya flour gives a larger yield of weight and enhances the keeping quality of the bread. A delicious toast is obtained from it. Thus soya flour and wheat flour are not competitors, but are natural allies, and their association will be of great benefit to the public as well as to the farmer, who is to-day compelled to sell his soybeans at a low price due to the limited demand."

Old Ripe Stilton

Many a festive board during Christmas-time has borne, among its other tempting delicacies, the noble Stilton reposing sublimely in its snowy napkin. When the candles are burning low and the crusted port is sipped with the reverence it deserves, is the time when this noble cheese appears. Cheeses in general have been much in the limelight of late; has not the poet T. S. Eliot made a moving plea for the formation of a society for the Preservation of Ancient Cheeses? To many the Stilton is the noblest of all cheeses. Its history is most interesting, and many details are to be found in a *History of Leicestershire*, published in 1800 by Nichols, who employed a number of people to gather material for his work. When the various items are joined together we get an interesting story. Apparently, one, Elizabeth Scarbrow (afterwards Orton), who settled at Little Dalby in 1720, was the dispenser of the famous cheese that was then called Quenby cheese. It got its present name because an innkeeper of Stilton town in Huntingdonshire bought it in quantities and retailed it to travellers. Mrs. Orton began to make it in Little Dalby about 1730 in small quantities—because it was thought at first that it could only be made from the milk of those cows which fed in one close —Orton's close. Later on this was found not to be the case. In 1756 it was made only by three persons, and that in small quantities, but by the time Nichols' book was written in 1800 we find that it was "made not only from one, but from almost every close in this parish and in many of the adjoining ones".

The Gentle Touch

In 1927 the champion Stilton cheese maker, who had won the cup three years in succession, is said to have stated that the gift for making Stilton cheese was inherited, and that it lay in the sense of touch in the finger-tips. Apparently at one stage in the process of making the cheese the curd has to be tested with the tips of the fingers to see if it has reached the right stage for the next process. It is rather a curious fact, according to a correspondent in *The Times* recently, that this champion Stilton cheese maker was born at Little Dalby, where the first cheese was made. There is another account of the origin of the cheese given by William Marshall, who was the author of a *General Survey of the Rural Economy of England*, about 1800. According to this, the first manufacturer was a Mrs. Paulet, of Wymondham, in the Melton district of Leicestershire, and she is alleged

to have been the only person who could make it for a long time, but later other dairywomen acquired the art, and those of Little Dalby took the lead. Subsequent investigation indicates that Mrs. Paulet was Mrs. Orton's daughter, so that, at any rate, the credit of priority remains in the family, though in this case the practice of a woman taking on her husband's name had led to some confusion. Marshall tells us that at that time (1790) "the price at present is tenpence a pound from the maker, and a shilling to the retailer, who takes it at the maker's weight". Even in those days there were middlemen, although not quite so well done to as they are to-day.

Vitamin A Standard

An enormous amount of work has been carried out in this and other countries on vitamin standards. Such investigations made in diverse places and by different workers require careful co-ordination before they can be put to their real utility. In the latest special report of the Medical Research Council—on the Standardisation and Estimation of Vitamin A—an attempt has been made to correlate the experimental work done by British workers in connection with the international standard for vitamin A. Material from different laboratories has been collected and blended into a coherent whole. Among the researches was the discovery of a suitable solvent for crystalline carotin. The solvent obviously had to be one in which the carotin would remain stable and from which it would be well utilised by the test animals. Eventually coconut oil with added hydroquinone was selected. The next important task was the biological assay of pure B carotin, which was recommended as the international standard to replace the impure mixture of carotins provisionally adopted as standard in 1931. This can only be ascertained by a biological test in which the margin of error is great. The value of having the results of a number of laboratories from which to strike a mean is invaluable. A factor has been determined in order to convert the results of the spectroscopic test into international units for vitamin A in addition to B carotin. It is impossible to conceive at present the ultimate value of work such as this.

A National Food Policy

In his presidential address to the Anniversary Meeting of the Royal Society, Sir F. Gowland Hopkins asked the question: "Is the time yet ripe for the initiation of a comprehensive National Food Policy; one that will endeavour to adjust production, in a qualitative as well as a quantitative sense, to right consumption, and at the same time organise all the details of distribution on national lines?" This is a problem that, to our mind, cannot be settled by words and arguments. It is one of those problems that must be tried out. In the book *The Next Five Years* it is urged that no administrative action less comprehensive than a national policy of the kind in question could deal adequately with existing problems, and it is suggested that it should now be taken in hand. Other people are appalled by the magnitude of the task, and believe that we must wait for further knowledge. Sir Gowland Hopkins believes that, while we have yet a lot to learn about nutrition and food production, we have enough knowledge now to guide administration on the right lines. It is interesting to note that the Expert Commission on Nutrition (appointed by the League of Nations) held its first meeting last month and drew up a list, in order of priority, of the problems for future study at various scientific institutes, with a view to practical progress. This is a definite step forward, as it is the first time that nutrition has been dealt with at an international conference by European and American authorities.

Home Grown Barley

When the duty on beer was reduced in the Budget the Chancellor of the Exchequer made it a condition that the brewers should use an increased proportion of home-grown barley. Quite a number of people are under the impression that the brewers have not kept to their bargain and have forsaken home-grown barley for foreign. This idea is shown to be erroneous by figures published in a recent issue of the *Brewing Trade Review*. The brewers' purchases of home-produced barley and malt during the year ended June 30 last were 369,576 cwt. more than those of the previous year and nearly 2,000,000 cwt. more than the purchase two years ago. Imports of foreign barley declined in 1934 by approximately 420,000 cwt. These figures indicate that this year's purchases show an increase of 3·04 per cent. over 1933-34 and 30·18 per cent. over 1932-33. The returns of the Ministry of Agriculture prove that for the 1934 crop the average price of all barley per cwt. was 8s. 10d. against 7s. 7d. in 1932, and, as in 1934 the brewers purchased 56 per cent. of the whole crop and only 35 per cent. of the 1932 crop, it seems to us that the brewers have more than kept to their bargain and that their action must have meant substantial relief to barley growers in this country.

MODERN ICE-CREAM PLANT

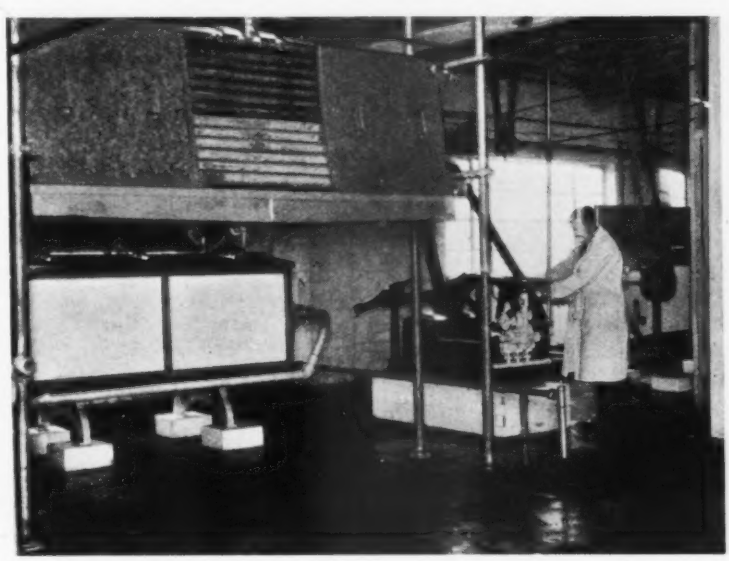
By L. J. Hynes

THE PLANT which is nowadays considered essential in a well-equipped factory of any considerable size includes a freezer or freezers, batch mixers or mixer-pasteurisers, a homogeniser or viscoliser (the latter being a homogenising machine with certain distinctive features), coolers, ageing vats or holding tanks, and, at any rate in many factories, packaging machines and machines for turning out wrapped bars of ice-cream coated with chocolate. In addition, various compressors are required—*e.g.*, for the cooling of the brine used to supply the freezers, when brine machines are used, and for the refrigeration of the hardening room or rooms without which no considerable factory could carry on business. When large quantities of ice are made, as is the case in some factories using ice for the transport of their ice-cream or for conserving it at retail points, the appropriate plant is, of course, required. The manufacture of ice, however, is not an essential part of an ice-cream maker's business, and, therefore, it is not within the scope of this article to deal with the plant incidental to it.

Freezers

The freezer is, on the whole, the most important piece of equipment in the factory, and will, therefore, be dealt with first.

Modern freezers, excluding those intended solely for comparatively small-scale production, may be divided into two main types —viz., batch freezers and continuous freezers. Under batch freezers we have brine and direct expansion machines. The former, having held the field for some twenty years or so, and having given excellent service meanwhile, are still in very extensive use, but the latter, which have lately been brought to a very high pitch of perfection, are coming more and more into favour. Continuous freezers, as will be seen in a moment, are of a type entirely different from batch machines and are extremely interesting. Whether or not the continuous freezer, as a type, will justify its claim to be the freezer of the future must remain to be seen, but a personal view is that the best specimens of it will definitely establish themselves as among the finest freezing machines ever made.

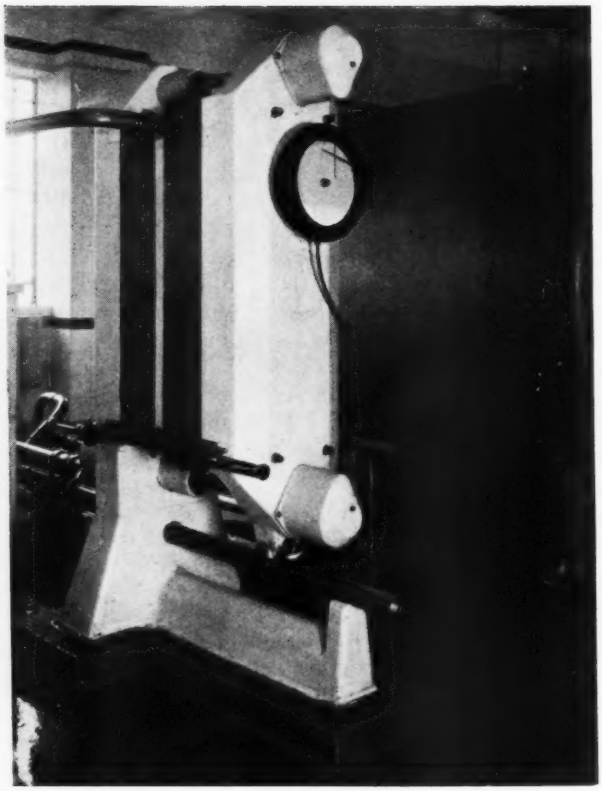


A De Laval Homogeniser and Ice-Cream Plant at Messrs. Shales' Ltd., Walthamstow. (By courtesy of Alfa-Laval Company Limited.)

Brine-cooled and direct expansion batch freezers are much the same in the essential manner of operation, and differ chiefly in regard to the refrigerating agent used. Both machines consist of a horizontal metal cylinder fitted, inside, with a detachable two-piece dasher. The function of one section of the dasher—the dasher proper, that is—is to revolve at high speed (*e.g.*, 200 revolutions per minute), and thus to keep the mix to be frozen in a constant state of vigorous agitation, throwing it against the sides of the cylinder which are themselves in contact with the cooling agent and are thereby chilled. The function of the other part of the dasher—the scrapers—is to scrape from the cylinder sides the thin films of ice-cream as they are frozen thereon, and thus to assist very materially in producing uniformity in the carrying out of the freezing process.

In *brine-cooled machines* the refrigeration is effected by means of very cold brine (temperature no higher than zero F., if possible, and preferably below it), which is pumped from a mechanically cooled supply stored in a convenient tank, the brine being caused to circulate at high speed round a jacket or, in more rare designs, through a coil surrounding the freezing cylinder. It will be seen that an abundant supply of brine of the necessary low temperature is vital to the success of the freezing operation, which would otherwise be unduly prolonged, thus adversely affecting the economy of manufacture and, especially in some cases, the texture of the ice-cream produced.

In *freezers of direct expansion types* the work of refrigeration



The latest type of A.P.V. Stainless Steel Ice-Cream Mix Cooler, with Mix Ageing Tank in background, manufactured by the Aluminium Plant and Vessel Company Ltd.

is carried out by the vaporisation of liquid ammonia in the freezer jacket. The vaporisation, and with it the refrigeration effect, of course, is readily controllable by opening or shutting off a suction valve, the suction pressure above the ammonia in the jacket being thus regulated. By means of a flooded system now generally adopted, a certain level of liquid ammonia is maintained in the jacket, the cooling agent being admitted through a float valve mechanism. When the suction valve is opened the ammonia evaporates in taking up heat from the freezer walls, and the ice-cream mix in the cylinder is frozen in films against these cold walls in exactly the same way as in the case of brine-cooled machines. The fact that both the brine and direct expansion machines admit of a large measure of control of the freezing operation, since in both cases refrigeration can be started or switched off at will, is of enormous importance as affecting both the quantity and quality of the ice-cream produced.

Batch freezers are marketed in six or seven sizes, which range from some 20-quart capacity (in the case of a few small machines) to a capacity of 160 quarts. Machines smaller than the 20-quart size may very rarely be made, but, as far as the writer is aware, the 160-quart size is never exceeded. Indeed, this size is comparatively rarely used. As a rule, it is better to have several smaller machines than half the number of larger ones. On the whole, one would say that the 40-quart size is the most popular.

The *continuous freezer* has little or nothing in common with the batch machine. It does not freeze ice-cream mixes in batches, but delivers a continuous output as long as unfrozen mix is fed into it and the machine is kept in operation. The early continuous freezers were unsatisfactory in more ways than one, but a few years ago an American machine achieved an outstanding success, and there can be no reasonable doubt that this machine, and probably others of continuous types, will have a big future. We take the American machine as an example of the way in which continuous production is effected.

In this machine, which is now marketed in several sizes, there are one or more jacketed freezing tubes. The first stage of a two-stage pump propels mix into the tubes, while the second stage pumps a controlled amount of air into them to be incorporated with the mix and, by thus expanding it, to produce the proportion of swell or overrun desired. Inside each freezing tube (when the machine is equipped with more than one, as in the larger sizes) is a revolving dasher which throws the mix against the mechanically chilled sides of the tube. The diameter of the tubes is only 3 in., so that, allowing for the displacement of the dasher, there is only a small amount of mix in a tube at any given time. This small amount can, therefore, be frozen very quickly in a thin film. In point

An interior view of the "Q" Ice-Cream Company's factory at Shalford, near Guildford, Surrey. A large number of "Hallmark" automatic ice-cream conservators have been supplied to this company for storage purposes and they are scattered over a very large area in the central part of the South of England.

of fact, the unfrozen mix can be converted into ice-cream of quite exceptional firmness of body and smoothness of texture in some dozen seconds or so. It is then propelled through the tube to be delivered at a convenient outlet, the second stage of the pump supplying the necessary pressure. In this way the output of ice-cream is continuous, and is at the rate of, say, 60, 100, 150 or 300 gal. an hour, according to the size of the machine used.

New plant and machinery comprising a complete installation for ice-cream making for the Swan Food Products Limited, supplied by Randall's Refrigeration Limited, and embracing ice-cream mix preparation machinery, cold stores, hardening chambers and automatic refrigerating plant.

Batch Mixers

These vessels, in which the mix ingredients are assembled and, as a rule, pasteurised, are of various types. In all of them suitable means is provided of keeping the mix in a constant state of agitation, revolving or oscillating paddles being commonly used for the purpose. In some vats the heating is effected simply by heating water placed in a surrounding jacket. In others, hot water is circulated through a coil which is caused to revolve inside the vat, thus coming into contact with the mix itself. A third type of vat is that in which the mix is heated by the spraying of hot water on to the outside of the vessel containing it (the inner side of the jacket, therefore).

Glass-lined vats, in which agitation is supplied by a propeller device, are nowadays in extensive use, and there can be no doubt that they are eminently sanitary. As will readily be seen, they eliminate the possibility of metallic contamination of a mix. Good results have also been obtained from the use of certain stainless steels in mixing vats. Copper vats may be used, but the utmost care should be taken to preserve the tinned surface in perfect condition; otherwise, copper contamination, resulting in the development of curious and very unpleasant off-flavours in the ice-cream, is likely to supervene. If, of course, copper or copper alloy vessels are kept well tinned, no objection can be urged against their use as mixing vats.

Ageing Vats and Holding Tanks

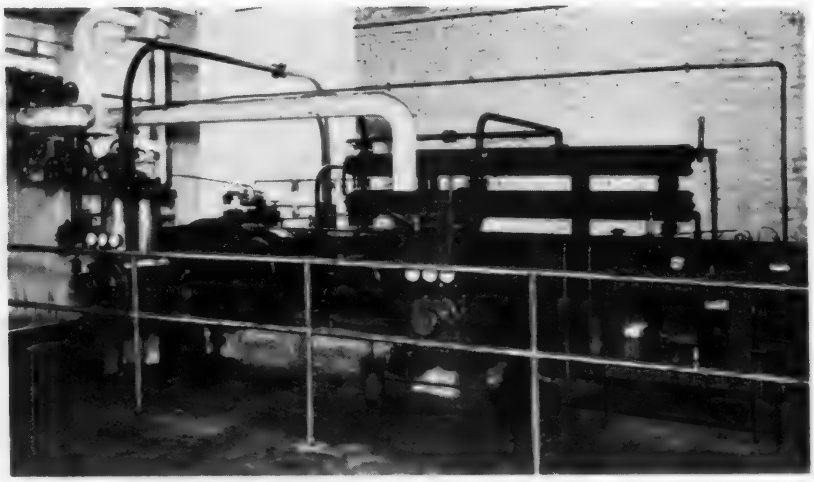
Prolonged ageing of a mix—"ripening", as it used to be erroneously called—is no longer considered necessary. Four-hour ageing, however, is generally desirable, and, indeed, there are still some manufacturers who prefer to age their mixes for considerably longer. When this can conveniently be done it is, admittedly, of some advantage, if not always of very much; certainly, nothing can be said against the practice, provided the mix is kept at a suitably low temperature—preferably at about 36°, or no higher than 40° F. —during the ageing period. Vats may be used simply as holding tanks, and often are.

Ageing vats are much the same, and are made of the same general materials as batch mixers, the chief difference—usually the only one, in fact—being that the mix is cooled, of course, and is kept cold, instead of being heated. For this purpose mechanically cooled brine is often used. There are vats and tanks of many sizes available, from the small ones suitable for manufacturers with very limited outputs to large tanks providing storage for hundreds of gallons of mix.

A complete Ice-Cream Making Plant installed in the Nottingham Co-operative Society's dairy. The twin cylinder "Wembley" type ammonia compression refrigerating machine on the left operates with full automatic control. (With acknowledgments to J. and E. Hall Limited).

Homogenising Machines

It is generally acknowledged that a homogenising machine is indis-



The automatic refrigerating plant supplied by Randall's Refrigeration Limited to the Swan Food Products Limited, which consists of 125 and 112½ h.p. ammonia compressors and embodies the latest flooded system coolers, with float valve control. Interchangeability of compressors on any of three duties is a distinctive feature.

pensable in any considerable ice-cream factory. Not only does it much improve the texture, and therefore the palatability, of the ice-cream, but it makes possible the use of butter (and, incidentally, less desirable vegetable fats), as the chief or sole source of the necessary fat. However, its main work and principal value lie essentially in the homogenisation of the ice-cream mix by pumping it, under any pressure up to 5,000 lb. per square inch, through an extremely narrow slit called the homogenising valve, the solids being thus reduced to the minutest particles and the whole mix "homogenised", or rendered physically uniform. Viscolisers are homogenisers with one or two special features.

Homogenising machines in general are of two kinds—single-stage and two-stage. In the latter, a mix is homogenised twice, the first homogenisation being caried out at the higher of the two pressures employed—*e.g.*, at 2,500 or 3,000 lb. per square inch. Both single-stage and two-stage machines have given excellent service, and both are in extensive use. Probably the preference of most producers is for the two-stage units. A typical homogeniser of a size suitable for a fair-sized factory is one with a capacity of 500 gal. of homogenised mix per hour. A machine of 1,000-gallon-an-hour output would suit a large business. There are now available very much smaller machines of excellent design and construction, so that there is no reason why the benefits of homogenisation should not be enjoyed by the quite small trader. As might be expected, there are more or less considerable differences in the design of the many homongenising machines now on the market, but the principle of operation is in all cases basically the same. Nearly all the large-calibre machines have three cylinders, but to this general rule there are one or two exceptions.

Packaging Machines

The work of a filling machine is to deliver into cartons, cups or other containers of any size up to about a quart, a measured quantity of ice-cream from a hopper to which the freshly made product is transferred from the freezer. In carrying out this work different means are employed; for example, some machines operate on a plunger system, the ice-cream being propelled into the containers, others depend on flow by gravity, while others rely on suction.

The most "complete", automatic, motor-driven filling machines can adequately deal with one, two or three flavours as may be desired, and can cope with containers of practically any ordinary size or shape, the filling and capping of the containers being done at high speed. For the smaller manufacturer there are many excellent machines which are operated by hand, and some of these can deal satisfactorily with either one or two flavours, though not, as far as the writer is aware, with three. When a continuous freezer is used the filling of individual packets may be carried out, without the aid of a machine, direct from the freezer, but there is at least one filling machine which may be used successfully with a freezer of continuous type—or of ordinary batch type, for that matter.

A battery of "York" Horizontal Direct Expansion Ice-Cream Freezers. (By courtesy of York Shipley Ltd.)

Coated Bar Makers

Since a Mr. C. Nelson introduced the "Eskimo Pie", a chocolate-covered bar of ice-cream, in 1921, the demand for this and similar products has grown enormously. In this country the idea did not at first "take on" to any marked extent, but of late the chocolate-coated bar in one form or another has become decidedly popular, and it is the writer's opinion that its popularity will grow.

Chocolate-coated bars can be made by hand at a fairly fast rate—fast enough, that is, for the comparatively small manufacturer—but the bigger producer needs a machine. He has a considerable variety from which to choose, but will almost certainly be safe in getting any machine manufactured by a reliable and experienced firm. An efficient machine for this work cuts, dips into melted chocolate, and wraps the ice-cream bars at the rate of many dozens an hour—90 or 100 dozen, for instance. Some firms prefer to turn out their coated bars on sticks, somewhat after the manner of the water ice "popsicles", and these lines are certainly very convenient. For them also there is an appropriate machine which produces the coated bars, complete with sticks, at a maximum rate of some 125 dozen an hour.

Three Cherry-Burrell Vogt Instant Freezers in operation. On the extreme left is a Cherry-Burrell fruit feeder which injects whole fruit and nuts into the stream of ice-cream leaving the freezer. The girls in the illustration are making, filling and closing cartons at the rate of 450 gallons of ice-cream per hour.

Coolers

For the cooling of mix as it comes from the homogeniser most large and moderately large factories employ a cooler of the familiar tubular, surface type. Some, however, prefer enclosed coolers. These are essentially similar to pasteurisers—in fact, there are pasteurisers which may be used as coolers—the only difference being that a cooling medium, like cold brine, is circulated through the coils instead of a hot.

The most popular tubular cooler consists of a set of pipes over which the hot mix, as it is pumped from the homogeniser (or mixer, when the mix is not homogenised), is made to flow. Tubular coolers are either (*a*) water-and-brine cooled, or (*b*) direct expansion (ammonia) cooled. In the former, cold water circulates through the upper pipes and cold brine through the lower, the mix being chilled, in its passage over the pipes, to about 40° to 45° F. In ammonia-cooled units it is possible to reduce the hot mix to a temperature of 32° F., or even lower—within two or three degrees of the mix freezing point, in fact. In all tubular coolers the chilled mix is collected in a trough at the bottom of the pipes, and from this trough it passes, on removal of the stopper in the vent-hole, to cans or pails placed to receive it.

Typical Ice-Cream Brick Hardening Room, capable of maintaining a temperature of −20° F. (With acknowledgments to York Shipley Ltd.)

This is hardly the place in which to notice such heavy-duty machines as refrigerating compressors, which could only be usefully discussed in an article on cold rooms or on some such subject as mechanical refrigeration. For the rest, useful machines like overrun testers (useful, but scarcely essential), together with much plant of comparatively small calibre, including units invaluable in the distribution of ice-cream and in its manufacture on a small scale, may possibly be dealt with at some future time.

A HEAT-RESISTANT STRAIN OF CL. SPOROGENES

By John George Baumgartner and Malcolm Douglas Wallace

(Bacteriological Laboratory, Messrs Crosse and Blackwell, Ltd., London, S.E.1)

IT IS generally accepted that spores of the sporogenes group are among those of the clostridia that are more resistant to thermal destruction. Hall,[1] who made an extensive survey of *Cl. sporogenes* strains, remarks on the general ability of these organisms to withstand heat sterilisation. Esty and Meyer[2] determined the heat resistance of spores of *Cl. botulinum* in buffer solution at *p*H 7·0. The maximum resistance observed under these conditions was as follows:

330 min. at 100° C.
10 ,, ,, 115° C.

Later, Esty[3] concluded that *Cl. botulinum* formed more resistant spores than any other anaerobe; but Meyer and Lang[4] report that a greater resistance to heat is exhibited by the spores of an anaerobe isolated by them which they named *Cl. caloritolerans*. Spores of this organism survived heating at 100° C. in buffer solution at *p*H 7·0 for 520 min.

While investigating potential sources of anaerobic infection in connection with food preservation, an organism was isolated from air-borne dust containing animal fur. This organism exhibited such exceptional powers of heat resistance that it seemed to us to warrant further investigation, especially as regards its thermal resistance.

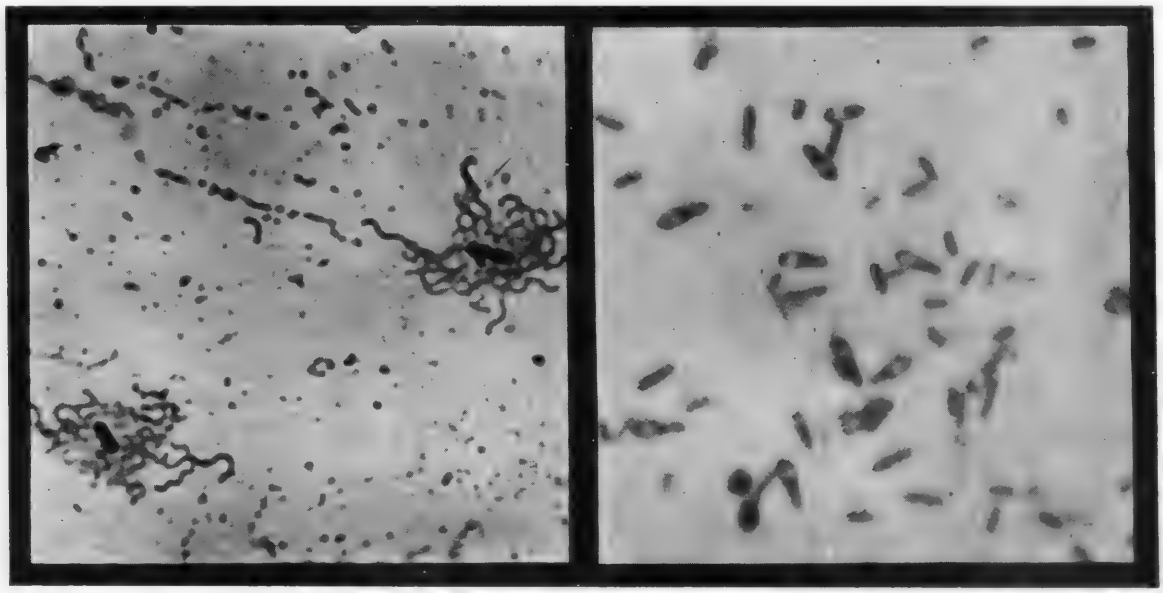
Subsequent study of the organism in pure culture revealed its agreement with the chief characteristics reported for *Cl. sporogenes* by Topley and Wilson.[5] Therefore, with a view to comparative study, two strains of *Cl. sporogenes* known as "No. 42" and "Bellette" were obtained from the National Collection of Type Cultures.

Investigation has shown that the reactions of our strain, which henceforth will be termed "No. 14" in this report, agree in the main with the characteristics exhibited by the *Cl. sporogenes* strains. It appears, however, to be much more resistant to heat and is, consequently, of greater significance in food preservation.

Description of Strain No. 14

Morphology.—In 24 to 48 hour cultures, the cells occur singly or in pairs and vary somewhat in size. The average dimensions are 5μ by 0·6μ. The rods are rounded at the ends.

Spores.—Spores occur freely on all ordinary media. They are large oval bodies, situated terminally or subterminally, but are occasionally found almost central (Plate A). The rods are swollen at sporulation, and in old cultures the vegetative portion of the cell tends to disappear.



Strain No. 14, 48-hour Agar Culture.
(Plate A. × 1,800.)

Strain No. 14, 24-hour Agar Culture.
(Plate B. × 1,800.)

Motility.—The cells exhibit a sluggish motility, while an occasional cell is actively motile. The disposition of the flagella is peritrichous (Plate B).

Staining.—The cells are uniformly stained by Gram's method.

O_2 Relationship.—The organism is an obligate anaerobe.

Temperature Requirements.—Optimum growth at 37° C. Growth occurs at 22° C. No growth at 56° C. in 14 days.

Agar Colony.—The colonies are round, convex, and smooth. Examined by direct light, the colonies appear finely granular, becoming translucent at the periphery, which is entire to undulate (Plate C). The colony is readily emulsified in water.

Streak Culture.—Beaded.

Cooked Meat Medium.—In this medium there is at first a slight reddening of the meat, which is subsequently blackened and digested with the production of a large volume of gas and a fœtid odour. An analysis of the gas formed in a cooked meat culture gave the following result:

CO_2 = 75·5 per cent.
H_2S = 18·8 ,, ,,
N_2 = 5·3 ,, ,,
H_2 = Nil.

Broth.—There is an even clouding of the medium with a greyish sediment which is somewhat viscid.

Milk.—Within 24 hours the casein is precipitated, followed by rapid peptonisation. Gas is produced. There is a slight increase in H-ion concentration during digestion.

Solidified Egg Medium.—The cube of solidified egg is completely liquefied in 4 days.

Gelatin.—Rapid liquefaction (within 48 hours).

Indol Production.—No evidence of Indol production in 10-day cultures tested with Erlich's reagent.

Nitrate Reduction.—No reduction of NO_3 in 10-day cultures tested with sulphanilic acid-naphthylamine reagents.

Fermentation Reactions.—Acid and gas is produced in dextrose, maltose, and glycerol.

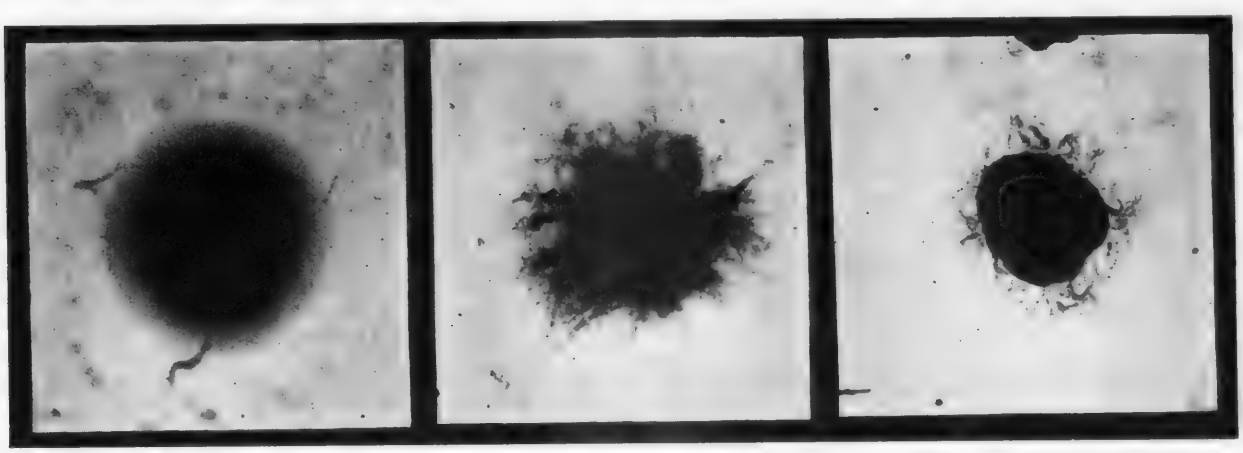
Strains No. 42 and Bellette

So far as we have ascertained, the features distinguishing these two strains are (*a*) colony appearance (see Plates D and E), and (*b*) fermentation reactions, strain Bellette producing acid and gas from glycerol in addition to the characteristic fermentation of dextrose and maltose. These points appear to constitute the main differences in the general reactions given by these two strains. In all other respects, excepting colony appearance, the reactions of these strains are similar to those described above for strain No. 14. We feel justified, therefore, in identifying strain No. 14 with the sporogenes group.

Heat Resistance.—The thermal resistance of the spores of strains No. 14, No. 42, and Bellette has been estimated. Tests were made by heating the spores in buffer solution at different *p*H values and in tubes of cooked meat medium at *p*H 6·8 to 7·0. It was felt that the conditions of the latter experiment were more likely to approximate those occurring in practice, as in the sterilisation of soups and other canned meat products, than were the tests made in buffer solutions.

Heating in Buffer Solution.—The buffer solution used was McIlvaine's,[6] using *p*H values of 7·0 and 4·5. The spores were obtained by washing the growth off 10-day-old agar cultures. After twice washing and centrifuging in the buffer solution in which they were to be finally heated, and after filtration through cotton-wool pads to eliminate clumps, the suspensions were standardised by micro-enumeration to a strength of 150 million cells per ml. One ml. amounts were then dispersed in Wright's pipettes. The pipettes had been treated with chromic acid cleansing solution to remove grease and free alkali. Heating was carried out in an autoclave in the case of the series treated at *p*H 7·0. During each heating the autoclave temperatures were checked against two mercury "tell-tale" thermometers.

The time taken for the temperature in the autoclave to reach 115° C. was approximately six minutes, and four minutes to fall to atmospheric pressure. The times given in the table below do not include such figures, but are a record of the actual exposure at the temperature stated. After heating, the tubes were cooled immediately in alcohol-ether mixture, sown into cooked meat medium,



Strain No. 14, 48-hour Agar Culture. (Plate C. × 18.)

Strain No. 42, 48-hour Agar Culture. (Plate D. × 18.)

Strain Bellette, 48-hour Agar Culture. (Plate E. × 18.)

TABLE SHOWING THE RESISTANCE OF STRAIN NO. 14 TO THERMAL DESTRUCTION.

Temperature °C.	Time of Heating.					
	No. 14		No. 42.		Bellette.	
	Survived.	Destroyed in—	Survived.	Destroyed in—	Survived.	Destroyed in—
100	15 hours	18 hours	60 mins.	90 mins	60 mins.	90 mins.
110	50 mins	60 mins.	—	15 mins.	—	15 mins.
115	40 mins.	50 mins.	—	—	—	—
120	15 mins.	20 mins.	—	—	—	—

sealed with a mixture of paraffin wax and vaseline and incubated at 37° C.; negative tubes for a minimum of four weeks. Growth did not appear in any tube after fifteen days' incubation. In the case of the series tested at *p*H 4·5, the heating was carried out in a water bath at 99·5° C. The conditions were otherwise as stated above.

(1) *McIlvaine's Buffer Solution* pH 7·0, 115° C.

	Survived.	Killed in –
No. 14	30 min.	40 min.
No. 42	—	5 ,,
Bellette	—	5 ,,

(2) *McIlvaine's Buffer Solution* pH 4·5, 99·5° C.

	Survived.	Killed in—
No. 14 ..	180 min.	210 min.
No. 42 ..	10 ,,	15 ,,
Bellette ..	10 ,,	15 ,,

Heating in Cooked Meat Medium.—Equal amounts (1 ml.) of a well-shaken 10-day-old broth culture were inoculated into tubes in triplicate containing 10 ml. of cooked meat medium at *p*H 6·8 to 7·0. With the exception of those heated at 100° C. in an Arnold steamer, the tubes were placed in the autoclave and exposed to various temperatures. The time taken for the autoclave temperature to reach 120° C. was approximately seven minutes and approximately five minutes to fall to atmospheric pressure. After heating, the tubes were cooled, sealed with the wax-vaseline mixture, and incubated at 37° C. as stated before.

It will be seen from these results that strain No. 14 is exceptionally resistant to thermal destruction. It appears to be quite capable of withstanding the heat treatment usually accorded canned products such as soups, and since it is extremely proteolytic, infection with this organism is bound to result in loss due to gaseous spoilage. The strain has been lodged with the National Collection of Type Cultures at the Lister Institute.

Our best thanks are due to Mr. J. F. Morse (Research Department, Messrs. Crosse and Blackwell, Ltd.) for producing the photomicrographs.

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[2] Esty, J. R., and Meyer, K. F. 1922. *Journ. Infect. Dis.*, **31**, 650, 663.
[3] Esty, J. R. 1923. *Am. J. Pub. Health*, **13**, 108-113.
[4] Meyer, K. F., and Lang, D. W. 1926. *Journ. Infect. Dis.*, **39**, (4), 321-327.
[5] Topley, W. W. C., and Wilson, G., *Principles of Bacteriology and Immunology*. London, 1931. Vol. ii.
[6] Clark, W. M., *The Determination of Hydrogen Ions* (p. 214). London, 1928.

Why Bread Consumption is Falling (from page 13)

pikestaff to anyone excepting experts. How true to say one cannot see the forest because of the trees! I don't give a tinker's curse for all the explanations, advertisements, assurances, etc., from those engaged in the wheat, milling and bakery trades, because none of them will admit the above facts. I suppose it is too simple. Some minds must expand a simple issue into an involved problem, raking in side issues and data which do nothing but hide the shining truth with a cloud of verbosity.

Who is to blame? I who am not a miller will tell millers this much (in case they don't know it, and if they do, why not mention it?): they cannot make appetising flour because the wheat which will yield such flour is not grown. It is the old tale of quantity versus quality. The original wheat as grown in Europe and some other countries was the real result of the centuries of usage, strain, soil and requirements, and there has never been and never will be again, I fear, finer and more palatable wheat than that grown from the native strains in England and France. However, economics and their revolting allies, the scientific experts, gradually changed the wheat strains. Everything excepting the taste of it was considered—quantity to the acre, keeping properties, size of the ear, winnowing properties, etc. France, whose wheat was once her pride, has contaminated her production with grain from outside sources, and to-day there is probably not a district in that country producing wheat comparable with that of a period no remoter than the immediate pre-war years. We owe to the Americas a wheat which is little better than cattle food, and it is offered to a public whose palate is becoming more discriminating and more pandered to in other directions than ever. I have not invented all this; it is common knowledge to any first-year student in any French agricultural college (among the best documented in the world).

I repeat, sir, I like bread very much indeed, in common with tens of thousands, but I do *not* like the insipid, unattractive, unpalatable mass daily presented to me and doubtless proudly called bread by that glittering array of superior intellects to mine, who are engaged in controlling in all its ramifications, with their stupendous factories, laboratories and mechanisation, the "staff of life". I am afraid that one of the disadvantages of producing a periodical of such a high standard as FOOD MANUFACTURE is that its contents are so stimulating that it must cause a spate of letters similar to this, and, consequently, difficult to deal with. I pay you no idle compliment in saying one can read through the whole of your paper with profit and, what is more rare, with interest, even though the reader's material concern may be confined to a limited section only, as in my case.

Yours faithfully,
A. P. D. DUFOUR,
Secretary,
Chocolat P. Prestat,
Prestat Ltd., London.

(*Another letter on Bread Consumption appears on page 22.*)

CHEESE STUDIES

"COMPARATIVE STUDIES of some Cheeses containing *Penicillium Glaucum*" is the title of a paper read by Dr. F. Corminboeuf before the Canadian Chemical Convention held at Toronto last year and published in *Canadian Chem. and Met.*, 1934, **18,** 180. There are several cheeses imported into Canada which are very similar from the point of view of their organoleptic properties. These are—Grove City (American), Stilton (English), Roquefort (French), and Gorgonzola (Italian), and they have the characteristic grey mottling and develop the well-known peppery flavour. The mottlings are formed by the ramifications of the mould *Penicillium glaucum* which is seeded into the curd before being placed into moulds, and again later when it is desired to accentuate the green or blue mottling, and to aid ripening. The odour and taste characteristic of Roquefort and similar cheeses were first attributed to the spores and fructified conidiophores of the mould, and the aromatic chemical, ethyl butyrate, assumed to be present. Tests have shown, however, that the mould grown on artificial media does not develop the peculiar odour, and, further, cheeses do not contain ethyl butyrate. J. N. Currie (*J. Agric. Res.*, 1914, **2,** No. 1) made a study of the subject and came to the following conclusions:

(1) During the ripening of Roquefort cheese, a considerable amount of fat is hydrolysed. (2) *P. roqueforti* (*glaucum*) produces a water-soluble lipase which is the chief factor in the accomplishment of hydrolysis. (3) The hydrolysis results in the accumulation of the milk fat acids in both the free and combined states. (4) Of these acids caproic, caprylic, capric and their readily hydrolysable salts have a peppery taste and are responsible for the burning effect of Roquefort cheese upon the tongue and palate.

Similar observations should hold good, therefore, for other cheeses containing *P. glaucum*, and the volatile acids should be present in quantities proportional, so to speak, to the flavour or taste of the cheese. Further, if these volatile acids are really liberated from the glycerides by hydrolysis, there should be simultaneously an increase in total acidity and an increase in iodine value of the fat, because, contrary to rancidification by auto-oxidation, the hydrolytic changes do not affect the double bonds of the fatty acid molecule.

Dr. Corminboeuf's paper gave the composition of the four types of cheeses for the purpose of drawing comparisons. The final work has for its object the application of the conclusions given above to cheeses other than Roquefort. The results of the examination are given in the accompanying table.

With regard to analytical methods, the *p*H was determined colorimetrically, and the titrable acidity by the official method of the A.O.A.C. (*Tentative Methods of Analysis*, 1930, p. 239). The volatile acids were estimated by McCanchey's modification of the method of Edelstein and Welde (*Deutsche Archive für Physiol. Chem.*, **72,** p. 140), and the lactic acid by the method of Leone and Tafuri (*Le Lait*, 1031, No. 107). This is based on the oxidation of lactic acid into acetaldehyde and the conversion of this latter into the oxime. The ammonia was determined by distillation of the aqueous extract of the cheese with and without the addition of MgO to arrive at the total and free ammonia respectively. It is interesting to note that the heat of bromination can be carried out on the cheese without preliminary extraction of the fat.

	Grove City.	*Roquefort.*	*Gorgonzola.*	*Stilton.*
Water, per cent. ...	37·53	36·90	38·15	35·43
Proteins, per cent. ...	21·50	21·33	23·22	23·51
Fat, per cent.	31·25	31·20	30·81	31·50
Ash, per cent.	6·00	6·90	5·50	4·20
Acidity, *p*H.	4·0	4·5	6·0	6·2
c.c. 0·1*N*. NaOH per 100 gm.	184	146	108	105
Total vol. acids as butyric	1·3060	0·4279	0·3450	0·3437
Free vol acids as butyric	0·8448	0·1084	0·0000	0·0000
Combined vol. acids as butyric	0·4612	0·3194	0·3450	0·3437
Lactic acid	0·0340	0·0000	0·0000	0·0000
Total NH_3...	0·365	0·348	0·512	0·302
Free NH_3 (*a*)	0·187	0·178	0·322	0·170
Combined NH_3 (*b*) ...	0·178	0·170	0·190	0·132
NH_3 ratio (*a* : *b*) ...	1·050	1·047	1·694	1·287
Iodine value (on fat) Hubl.	46·41	52·33	47·05	44·56
Heat of bromination (*c*)	8·2	9·0	8·5	7·9
Iodine value calc. = c × 5·5	45·10	49·50	46·75	43·45
Heat of bromination (direct on cheese) (*d*)	8·4	9·8	8·6	8·0
Iodine value calc., d × 5·5	46·20	53·90	47·30	44·00

WHY BREAD CONSUMPTION IS FALLING

A Letter from Mr. A. P. D. Dufour, of Prestat Ltd.

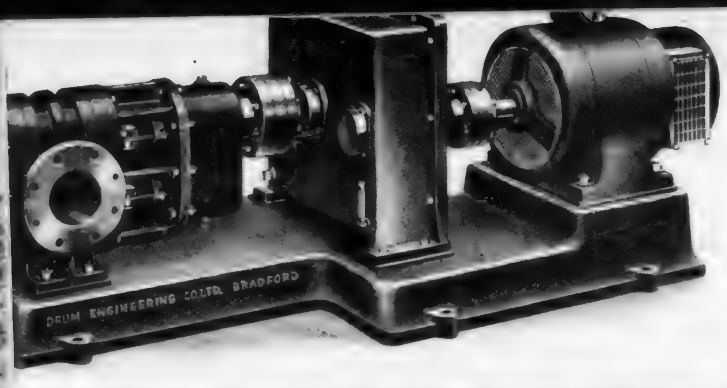
SIR,

I am wondering if you can find space for a word from a mere consumer and, consequently, figurative spectator of the clash of giants in the verbal bread battle taking place in your columns. I am of French extraction, which indicates I am a bread eater on a much larger scale than the average pure-blooded Englishman (whatever that may imply). The French as a nation have always consumed bread in quantities which must appear enormous to British eyes. On the other hand, they eat less cakes and pastry than the English do. Having spent a year or so of my boyhood in France, I can vouch for the fact that an average French long loaf was consumed daily by myself and many others. We had over a quarter of a loaf with our coffee, another quarter at lunch, a large length of bread with tablet chocolate at 4 o'clock (the "goûter" replaces our "tea" for French children), and more bread for dinner. The food in other ways was excellent and plentiful, so the bread was not merely for the purpose of "filling up corners". So far as I could see adults ate a great deal, too. French bread is never cut in our mingy little slices.

Nobody will deny that even the poor Frenchman has a better and more varied diet than his British contemporary, but the interesting fact emerges that the Frenchman eats a lot of bread because when it is good and made with the correct flour it is nice to eat, and a Frenchman knows good food when he meets it.

However, a more interesting fact emerges in France, and that is, bread consumption is diminishing in that country, and there is no *secret* reason for it. It is simply and solely because modern wheat and milling processes do not enable bakers to make nice appetising bread. This is as plain as a

(*Continued on page* 12.)



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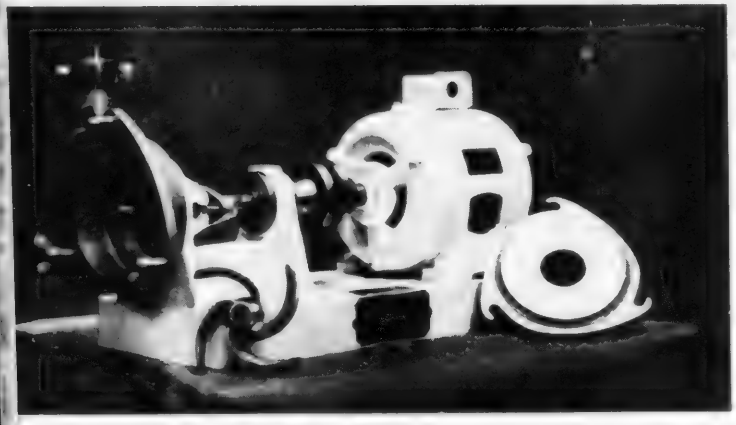
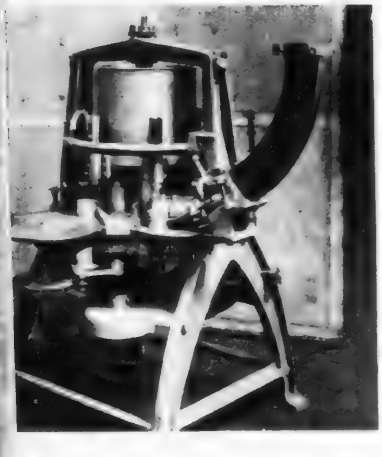


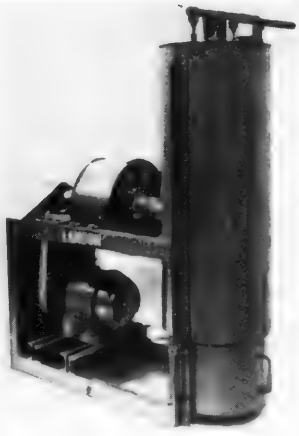
(3)

MACHINERY

(1) A Rapid Mixing machine made of Monel Metal throughout, employed for mixing lime fruit powder. The machine has a safety cover which when opened stops the machine. (By courtesy of William Gardner and Sons (Gloucester) Ltd.)

(2) The "Drum" Rotary Piston Pump applicable to the handling of foodstuffs. This pump will handle liquids as mobile as water and as viscous as molasses. The pump can be removed from bed-plate for examination without disturbing gear-box or motor. (With acknowledgment to the Drum Engineering Co., Ltd.)





(4) and (5)

(3) The "Pulsometer" Milk Pump, which is of robust and simple construction. It is made in metal unaffected by lactic acid. No tools are required for dismantling purposes.

(4) Mather and Platt, Ltd., have sent this picture of the M and S Universal Filling Machine for jams. It is fully automatic and designed to fill all standard bottles or jars without crushing the fruit. When no jar is presented, no jam is delivered.

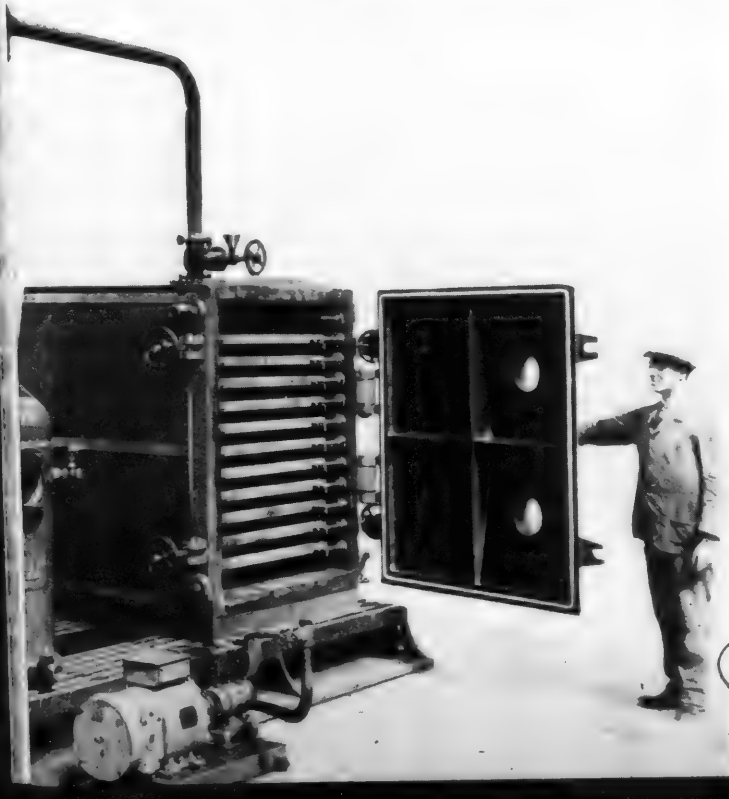
(5) A Lamson Unit Power Plant for Central Vacuum Cleaning used by various food manufacturing companies.

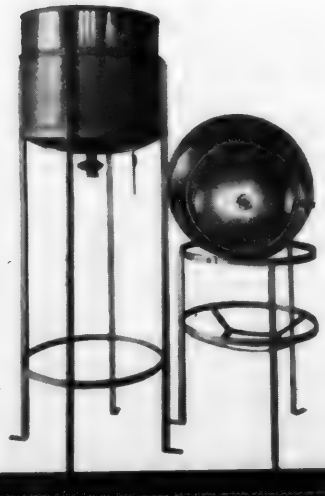
(6) A Drying Oven, with condenser and pump, built by Davy Bros. Ltd. A number of such ovens have been supplied for use in the manufacture of milk chocolate.

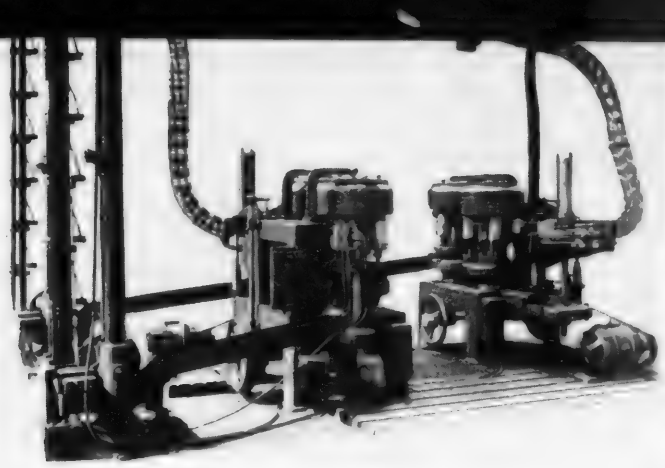
(7) Circular open-top Aluminium Syrup Tanks with coils and stands by Frederick Braby and Co., Ltd.

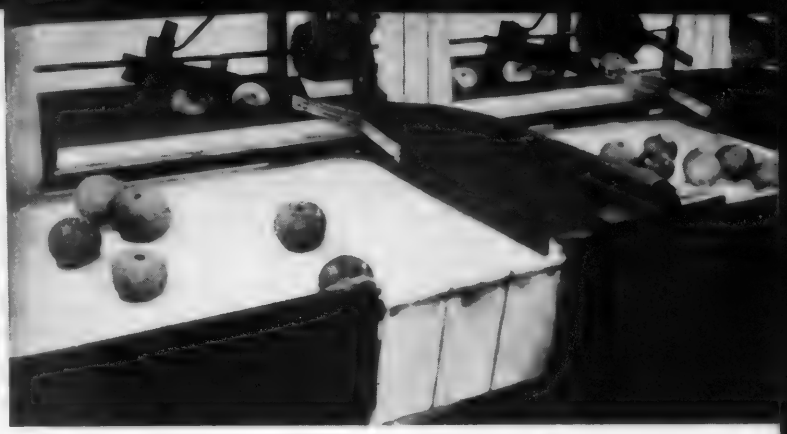
(8) A. B.C.H. pulping vessel for fruit, made throughout of stainless steel.

Bottom Row: (6), (7), (8)









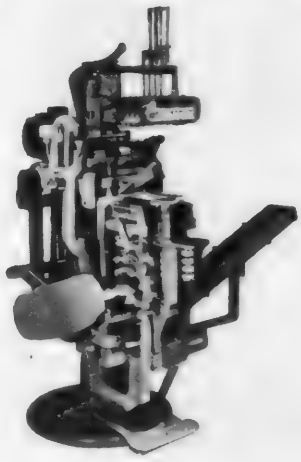
(9), (10)

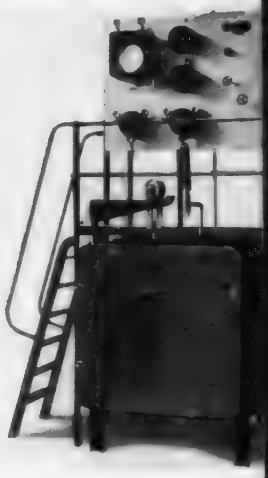
REVIEW

(Continued from last issue)

(9) A layout of Auto-Seamers for can-making. (By courtesy of S. Wolf and Co., Ltd.)

(10) The Weyland Apple Grader offered by Solignum Ltd. In travelling along the conveyor band, the fruit encounters tapered rollers of graduated diameters which throw them off into collecting trays. Apples, tomatoes and pears may be handled by this machine.

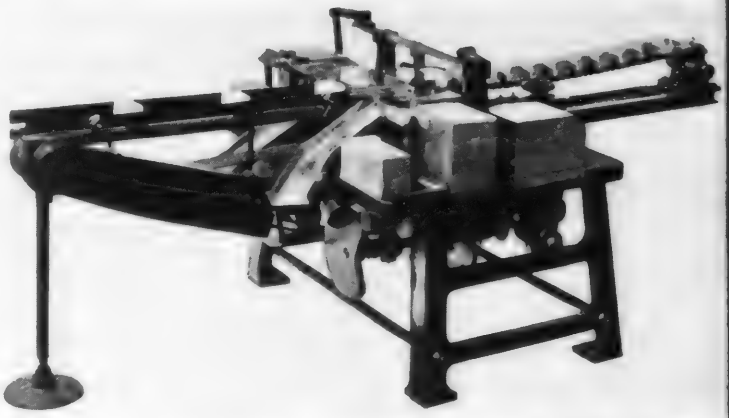




(11) and (12)

(11) The "Purdy" World Labeller specially made for labelling all round the circumference of small flat tins. This machine has an automatic 4-way feed and discharge whereby four tins are labelled at a time, giving four times the normal output.

(12) A Horizontal Food Processing Retort constructed by G. A. Harvey and Co. (London), Ltd.



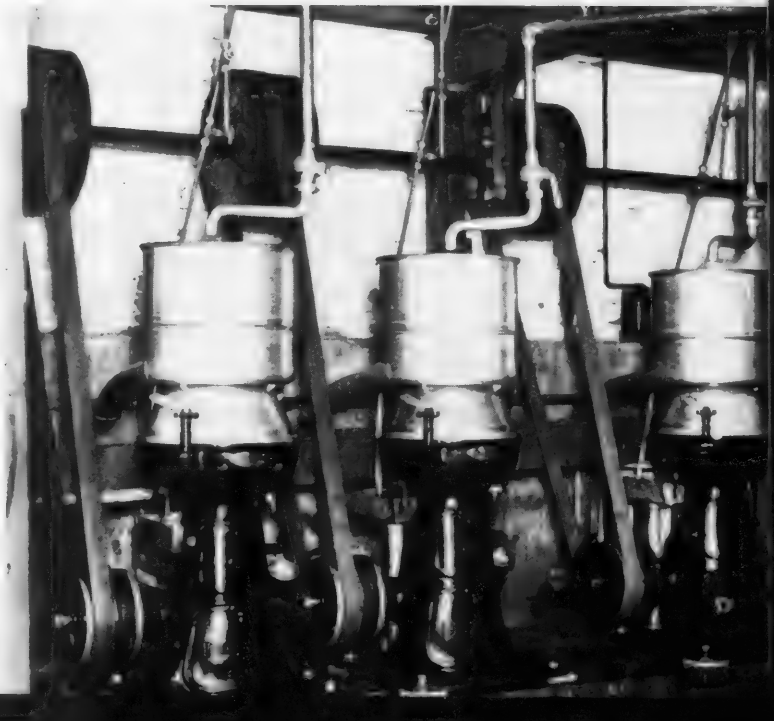
(13) An Automatic Check-Weighing Machine built by Southall and Smith, Ltd.

(13)

(14) The New Vacuum Sealing Machine for cans and glass jars produced by John Fraser and Son, Ltd.

(15) The Automatic Weighing and Packing Machine Co. of Birmingham commenced work less than a year ago, and have now produced five machines, of which a Power Weighing Machine suitable for handling small quantities is illustrated here.

(16) Three de Laval Yeast Separators used by Linson Ltd., of Hanwell, producers of Grayne Desiccated Yeast, this being a special process in which brewers' yeast is freed of all impurities and bitterness, and desiccated under conditions which preserve the life, fermenting activity, vitamin content, etc.



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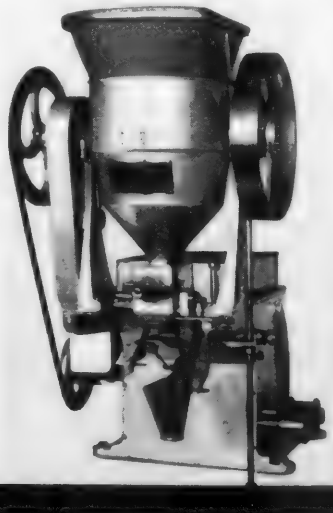


PASTEURISED OR UNPASTEURISED MILK?

By T. Crosbie-Walsh, F.I.C.

WE ARE suffering from the scourge of loose thinking. The man-in-the-street finds it difficult to come to a conclusion on questions about which he has perforce to rely on expert opinion, owing to their highly technical nature, and the extraordinary divergence of such opinion on the part of the experts.

It would be interesting to know the percentage of ordinary people having a clear idea on the matter of pasteurisation of milk, or even knowing whether their milk supply is pasteurised or not or what pasteurisation is and does?

For months past there have appeared articles and letters in the daily press, giving diametrically opposed opinions on the subject, and the anxious parents' minds must reel after their careful perusal. The volume of opinion for and against is such that it would be impossible to embrace all in the limits of a short article like the present one.

It has been sought to prove that the use of pasteurised milk in schools results in fewer children taking milk, because they do not like it. Also that it is responsible for rickets and other juvenile ailments. The children who can tell the difference between raw and pasteurised milk—especially when not critically tried side by side—must have pretty delicate palates. I should like to put three glasses of each kind of milk before them and ask them to sort them out. Quite a lot of little illusions about the taste of various things have been run to earth by this simple method!

There is the trial with school children as subjects. I don't know whether this has been concluded yet. 2,000 children were not going to have any milk; 2,000 were to have pasteurised milk, and 2,000 were to have raw milk. Quite interesting, but what data are to be collated? Are the children going to be "standard" ones? Is the home diet to be taken into account? Are the children to be given raw milk to be constantly examined for possible infection? Are medical histories of the subjects to be traced? Are children with a family history of tuberculosis or otherwise doubtful ones going to be fed on raw milk? Are all the data to be collated and the conclusions clearly presented and made available to all and sundry, over the signatures of authoritative names?

In the correspondence columns of the *Daily Telegraph* a short time ago there appeared a letter (signed with initials) in which the medical officer of Dr. Barnardo's Homes was quoted as scouting the pasteurisation of milk. If this is correct it may be inferred logically that the children at the Homes are not given pasteurised milk. If this is so, a good deal of valuable data should be available on this vexed question.

On such an important subject John Citizen and his wife, especially his wife, should be posted. No doubt this would be willingly done by the larger milk providers, but this might appear to savour of special pleading. It should be done at public expense just as is the campaign against the toll of the roads. That is, of course, if the danger is as great as the experts in favour of pasteurisation make out. There is much talk on the other side, such as vitamin destruction. Rickets might seemingly be avoided more easily than tuberculosis and the other things.

Once pasteurisation has been definitely proved not to bring ills in its train, it should be enforced by law. The law ordains that every child be vaccinated before it reaches the age of six months. True, this has been allowed to become practically a dead letter. Any parent may "solemnly declare that he conscientiously believes" that vaccination would be harmful to his child. This means that he signs on the dotted line before a J.P.—just another example of our wonderful capacity for compromise. Anyway, the law is there. And here is an interesting speculation—what are the relative chances of an unvaccinated child getting smallpox and a child fed on raw milk succumbing to the ravages of tubercle, of Bang's bacillus, or of hæmolytic mastitis streptococci?

Some of the objections to pasteurisation are little short of fantastic. For instance, that producers, relying on pasteurisation, would not bother about the initial cleanliness of their milk. Just as if surgeons, relying on their antiseptics, would allow their hospitals to be reeking with bacteria!

There appears to be no serious objection except the still hypothetical destruction of vitamins or other bodies hitherto not identified. Doubtless this point could be definitely settled by further research? In the meantime it should not be very difficult to disseminate the information which would enable their hypothetically destroyed bodies to be supplied from other sources?

One hears mostly about tubercle, but not much about *B. abortus* and the others.

The Danish Dr. Bang, in 1897, described a bacillus as the probable cause of infectious abortion in cows. Ten years before this Dr. David Bruce, of the British Army, was on his honeymoon trip on the Island of Malta. It has been described how he called his newly wedded wife from the tennis court to hold monkeys while he inocu-

lated them with problematical microbes. He discovered the organism producing Malta fever (*M. melitensis*), which is described in the medical books as "an endemic infectious disease characterised by an irregular fever, profuse sweats, pain, arthritis, enlarged spleen, and a tendency to relapse. When the agglutination test reveals the presence of the disease in any obscure chronic febrile attack the patient is put to bed . . ." etc.

Alice Evans, a girl bacteriologist in the Government Laboratories at Washington, U.S.A., found, after a long series of experiments, that the blood serum of a cow which had been inoculated with the Bang abortion bacillus had the power of clumping (or throwing down a suspension of microbes in salt water) the Maltese microbes of Bruce.

What does this mean? It means that the Bang and the Bruce organisms are twin brothers.

Her discovery received no notice in American medical circles for six years. Yet it was the remarkable one of identifying two previously considered different microbes —one causing sickness in Malta and the other an illness in American cows. An American writer has estimated that there were fifty thousand cases of people in the States sick with Malta fever. It was being diagnosed (according to the writer mentioned) as typhoid, "flu", malaria, or even tuberculosis. Other diagnosticians murmured something about nervous breakdown or run-down condition. None of these people took goat's milk, and there was no suspicion that the *B. melitensis* had anything to do with it. It was firmly held that only by the drinking of goat's milk could Malta fever be contracted.

It was found that there were cases in Denmark. They were proved to be more numerous than typhoid and para-typhoid cases.

It is a long story, probably interesting in its details to none but bacteriologists. But its practical implications *are* important. We all know those cases of low fever, of general malaise; how many of them are due to the *Bacillus abortus*?

Ben Davies, Director of Laboratories, United Dairies, Ltd., isssued a remarkably fair challenge to Mr. Harold Pears, Chairman of the Wiltshire Federation of Milk Producer Retailers, by the medium of correspondence in the London *Evening News*, in which he said: "Let him (Mr. Pears) supply a list of his members, the dairy herds of six of whom shall be submitted to a tuberculin test to discover the percentage of reactors therein. Let the milk be also tested for tubercle, for abortus, and for hæmolytic mastitis streptococci. I will engage that such a test shall be made without cost to Mr. Pears or to his association and that it shall be conducted by professional men of the highest standing, whose results shall be published." He also suggests that pasteurised milk shall be subjected to the same tests.

That was in June last. Was the challenge taken up? If not, why not?

For the sake principally of the young of this generation, why not get down to brass tacks? Let the matter be thrashed out—with gloves off. And let a decision be made. We can trust our scientific investigators; they have no axes to grind.

If raw milk contains—even in small proportion of the entire supply—these dangerous microbes, then let it be fearlessly blazoned abroad. Let a pamphlet be put in every household. Let films be made and exhibited. Let it be put across by the wireless, via Luxemburg if by no other way. *Get it across*, as the makers of ointments for bad legs, infallible beauty creams, pills for every ailment get across.

It is little short of amazing that the matter should begin and end in a few articles and a little correspondence in the papers.

Science must abandon its professionalism and adopt the methods of the commercial community.

THE PROPERTY MARKET IN 1935

We have received the following report from Chamberlain and Willows, Ltd.:

The opening months of 1935 produced surprisingly good business in all departments, the industrial property market being particularly brisk. This condition failed to hold, however, following the August break, and the year has ended on a subdued note.

A dominating factor in the suburban belt six to ten miles of the City of London has been the increasing scarcity of land available for industry, and the circle of industrial activity is consequently widening. The demand for suburban factories has not slackened in the least, as witness the extraordinary way in which prominent estates developed within the last two years have been completed. The arterial roads continue to attract many manufacturers, chiefly those of national standing and able to afford the high prices ruling for sites. Sales at over £7,000 per acre have been recorded recently for land in certain selected positions.

In the City areas a very healthy call has existed for newly built properties or those modernised to meet present needs. Older properties, however, have been in little demand and a decline in values has occurred. Many owners of empty properties have realised that a complete revaluation was necessary to effect disposal, and as a result have relet at considerably reduced rents.

Erratum

Owing to a printer's error, in the Machine Makers' News of last month, the Manesty No. 3 tablet machine was incorrectly called a "table" machine.

ALUMINIUM IN FOOD

PERHAPS THE best letter of all from the spate of those published in *The Times* during the past few weeks on this frequently recurring topic is the one from Mrs. R. A. Curtis of Oxford, which reads as follows:

"Some twenty years ago, when my four children were all very young, I purchased a very large and beautiful aluminium preserving kettle. Each year since then I have made for those innocent and defenceless children hundreds of pounds of jams, jellies, preserves, marmalade, and condiments in this same kettle, from currants, gooseberries, plums, rhubarb, sour oranges, and most other acid fruits. And to make the picture still more lurid, for one particular condiment, made and eaten each year in large quantities, two quarts of vinegar are added to a mass of acid tomatoes, onions, sugar, spices, salt, etc., and boiled for about three hours. With every apology to chemical science for being alive in the face of all this, my family are all in extraordinarily good health, my only problem being how to keep a sufficient quantity of these things on my shelves."

Others have asserted, without quoting scientific evidence, that aluminium vessels are vigorously attacked during cooking, and that aluminium compounds entering the human body are injurious to health to the extent of causing serious bodily disease. The lists have been entered by old campaigners against aluminium who started the attack a number of years ago with the fervour of a crusade that makes it seem all the more invidious and ineffective.

Even Mr. A. S. Russell, in the Science Series in the *Listener* of December 4 did not get all his scientific points right, but his treatment of the subject in delightfully simple language must have done much to allay unnecessary fears aroused by some of the uninformed writers to *The Times*.

Adverse comment has also been directed against enamel, whilst the comparative prices of different utensil materials have been forgotten by everyone except Mr. Russell. Where did the tin go that gradually left the tinned-iron saucepan which eventually started to rust? Nobody seems to have thought of starting this hare. Much confusion also arises from allusion to aluminium in the form of the soluble alum salt once used in baking powders and long ago prohibited in this country.

Ministry of Health Report No. 78

An official report on the subject of "Aluminium in Food" has been issued by the Ministry of Health. It is No. 78 of the Reports on Public Health and Medical Subjects, by G. W. Monier-Williams, O.B.E., M.C., M.A., Ph.D., F.I.C., which, like the previous report of Dr. J. H. Burn, Director of the Pharmacological Laboratories of the Pharmaceutical Society of Great Britain, prepared at the joint request of the Society of Public Analysts and the British Non-Ferrous Metals Research Association, covers a great deal of the ground.

In a prefatory note by the Chief Medical Officer, it is stated that the use of aluminium cooking vessels has been criticised from time to time on the ground that aluminium is a toxic metal and that the small amounts which may be dissolved and find their way into food may cause illness. So persistent have been these criticisms that many people have banished aluminium vessels altogether from their kitchens. Possibly, the prejudice against aluminium ware is connected with the use in some countries of alum as an ingredient of baking powder, a practice which is not countenanced in this country, he states.

The Report itself concludes with the remark: "There is, however, no conclusive evidence that aluminium in the amount in which it is likely to be consumed as a result of using aluminium utensils has a harmful effect upon the ordinary consumer. It is possible that there may be individuals who are susceptible to even such small doses of aluminium as may be derived from aluminium utensils, but evidence of this is inconclusive."

But though the effects of aluminium in food have not been exhaustively investigated, the very absence of conclusive evidence as to any harmful effects is sufficient to determine that there is no further necessity for such an investigation.

Teach Domestic Science

If only we could engender a wave of domestic science teaching and learning in this country there would be little or no cause for concern about any of the cooking utensils in use to-day. The addition of acid or alkaline substances to the ingredients in the pot would be practically unheard of. Cooking utensils would be treated with more respect. Utensils of any make should be well washed with good soap and water as soon as possible after use and put away dry. If they are of aluminium they may be scoured very occasionally with fine steel wool and good soap to restore the surface brightness. When this simple procedure is followed the amount of corrosive action is positively negligible, and any possibility of harmful effects must consequently be very remote. The salts of the water and of the ingredients generally assist in producing a protective oxide film which, though it imparts discoloration to the aluminium, is just as important to the resistance of aluminium as the transparent oxide film that protects stainless steel.

It is surprising that more advantage has not been taken of the deliberately produced anodic oxide film on aluminium, which is extraordinarily durable for ordinary cooking purposes, much harder than the metal surface, and highly resistant. Ordinary cooking utensils treated in this way show little or no change in colour from their general appearance even after prolonged use and it is quite unnecessary to scour them at any time to clean them.

These observations on the simple care of cooking utensils are made here because they apply equally to the use of vessels in the processing of foodstuffs on a large scale. The addition of sodium silicate to washing solutions to inhibit alkaline action on aluminium should be well known to every manufacturer.

G. W. L.

Cereal Chemistry in 1935

By T. H. FAIRBROTHER, M.Sc., F.I.C.,

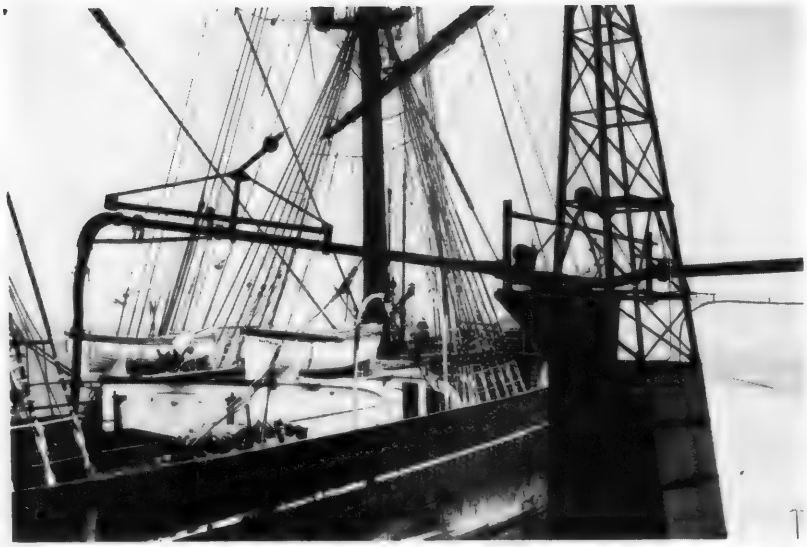
Chief Chemist McDougall's Limited

THE TITLE "Cereal Chemistry" is somewhat misleading. It has been accepted as embracing the activities of that group of workers who are engaged in elucidating some of the chemical and physical problems of the milling and baking industries. The term "Science of Milling and Baking" would be more appropriate, if less imposing than "Cereal Chemistry". Although chemistry plays an important rôle in the investigation of many of the problems of these two great industries, one is coming more and more to the realisation that the general trend is physical rather than chemical. One example of this tendency in big scale work is seen in the problem of flour improving. Until quite recently the improvement in the baking properties of certain flours was brought about entirely by the addition of various chemical substances such as acid calcium phosphate, potassium bromate, or ammonium persulphate. In recent years, however, at least two processes have been patented to improve flour by the purely physical method of heating it under controlled humidity conditions. These latter methods are employed more on the Continent, where chemical improvers are prohibited, than in this country, but the writer has been informed that large-scale trials with the Fisher-Jones Process in England have been very satisfactory. The problems facing those of us who are engaged in the scientific investigations of the milling and baking industries, are not problems of pure chemistry. They are scientific in the way that Huxley meant when he said science was organised common sense. Milling and baking are not simple processes. We are dealing with complex mixtures of a number of substances the nature of which is not completely known. There are the starches and sugars, the proteins and fats, the enzymes and the vitamins, all playing parts. The variation in the physical properties of the different proteins that go to form the complex known as gluten has much to do with the main problem. This involves the physical study of the behaviour of colloids. Other considerations are the swelling of starch, enzymic activity, and catalysis. In the scientific study of wheat, flour, and bread we need a blend of chemistry, physics, and biology, for the main laboratory investigations. It is evident, therefore, that laboratory investigations will be more on mechanical or physical lines than purely chemical, and must be dealt with first.

Physical Investigations

Probably the greatest developments in this direction have taken place in the Brabender Laboratories at Duisberg. The writer spent some time there a few months ago, and saw and investigated some of the appliances in use. The farinograph and fermentograph are becoming more widely known in this country and America. By purely mechanical means these two instruments can be utilised to visualise the baking characteristics of any flour. Brabender works on the assumption that the baking value of a flour can be expressed by the ratio of dough structure to gassing power. For this purpose dough structure is characterised by the ability of the dough to absorb more or less water, to resist mechanical abuses for a shorter or longer period, and to give a larger or smaller volume. These factors are measured by the farinograph and recorded graphically on the farinogram. The whole principle depends on the resistance offered by the dough to beaters in a standard mixing bowl at constant temperature. The resistance is measured by a dynamometer and recorded on a graph. The gassing power is the ability of a dough to produce more or less carbon dioxide at an earlier or later stage during fermentation. This is measured in the fermentograph. Brabender's whole thesis is that the simultaneous consideration of these two factors, dough structure and gassing power, gives the conception of "baking value". This is a big assumption and there are a number of objections, such as the possibility of stickiness developing in a dough and offering a resistance to the beaters that may be mistaken

A number of English and foreign Cereal Chemists and Milling Engineers at Brabender's Laboratories, Duisberg, Germany, in October, 1935.



Unloading wheat from a windjammer at Millwall Docks, London, by the suction intake pipe.

for strength. Any purely mechanical picture necessarily has its limitations, but on the whole this picture of Brabender's is the best we have available at present. During 1935 considerable advances were made in the use of these machines and their value is becoming more appreciated.

The Farinograph and Proteolysis

Recently an interesting paper was published by Quick Landis on "An Index of Proteolytic Activity by the Use of the Farinograph". Proteolytic activity is demonstrated by what are called "rest curves" on the farinogram. The dough is mixed in the farinograph until the curve reaches its maximum point. The heaters are stopped and the dough left to rest for an hour, after which the farinogram is continued. During the rest period enzymes are at work and any differences in the stability of the dough as recorded on the curve are attributed to enzyme action. Quick Landis has introduced a number of refinements and has developed a method which appears to be fairly reliable. A unit of proteolytic activity has been defined and the degree of proteolytic activity of a substance is taken as the number of enzyme units per gram of material. The unit is believed to be independent of the flour used to prepare the standard dough.

The Farinograph and Absorption

An important factor in test baking is the amount of water absorption. The usual method of judging the optimum absorption is by handling the dough, and this varies with the manipulator. There have been repeated efforts to obtain a reliable mechanical method which will be independent of personal judgments. Among these were Chopin's Extensimer and Harrel's Penetrometer. St. John and Bailey took a wattmeter measurement of the power required in mixing a dough in a motor-driven mixer. During the year Cleo Near and Betty Sullivan have published a paper which indicates that the farinograph gives accurate, reliable, and easily replicated absorption results. It is stated that the "absorptions determined by this method have been found to be highly satisfactory in our test baking procedure". If this is so it marks a definite step forward in ensuring the accuracy of test baking.

The Farinograph and Wheat Hardness

One of the most important considerations in wheat conditioning is the relative hardness of the grains going to the mill. Obviously, as grinding is mechanical, the hardness of the feed is an important factor in determining how the wheat will break up. Brabender has applied the farinograph to give a numerical expression of the hardness of different wheats. The principle is simple. The mixing bowl of the farinograph is replaced by a standard grinding mill. The resistance offered by the different grains against the standard grinding gear is measured on the dynamometer and recorded graphically.

The Fermentograph

While the main use of the fermentograph is to measure gassing power, it can be applied to other purposes. Thus Near and Sullivan have applied it to a study of yeast variability. It is very important to be able to ascertain the variability of different brands of yeast, and the uniformity of each individual brand from day to day in any laboratory where test bakes are taken seriously. It is not surprising, therefore, to find that a large number of investigators have published researches on the subject and a variety of devices have been tried. In September, 1935, Near and Sullivan published their paper on the application of the fermentograph to the problem. They state "it is believed that this apparatus affords a more accurate and easily replicated means of measuring gassing power by any given formula than has been hitherto available". This work provides a very useful means of checking up yeast quality from day to day and adds another factor to assist in regularising the test bake.

Moisture Testing

As the moisture content of wheat and flour is so very important it is not surprising that during the year under review there have been a number of papers on the subject. Lanning has described a study of temperature changes in a small laboratory oven when drying flour. He found, as other workers have also found, that there is a considerable difference of temperature at various positions in the oven. Lanning states that in all method specifications two points should be referred to: (1) the placing of the thermometer—*i.e.*, how far it should be from the oven shelf on which the samples are placed and whether it should be above or below the shelf, and (2) the time allowable for the oven to regain its original operating

temperature after the samples have been inserted. These are points of importance to those who employ the oven methods of moisture testing. The discovery of Lanning's that temperature variations had a definite effect on the moisture results and that different temperatures existed at different levels in the oven, led to a further study by Davis on other factors affecting the results, and he produced data to show that a forced draught system in the air oven can be utilised to give a considerable saving in time with no sacrifice of accuracy or precision. Samples dried twenty minutes in forced draught at 140° C. gave accurate and uniform results when compared with the official air oven procedure. The methods committee of the American Association of Cereal Chemists appointed a special sub-committee to make a collaborative survey of moisture methods for mill feeds. During the year the report was published at the Annual Meeting, June, 1935. After numerous trials, the committee decided that consistency of results appears to be greater by the vacuum oven method than by the air oven methods. It was also found that air ovens heating for one hour at 130° C. gave more consistent results than two hours at 135° C. Bunzell has published work on the Bunzell-Becker moisture determination apparatus. This was designed to eliminate to a large extent the influence of the variable operation of individual workers. It is an ingenious piece of apparatus and seems almost foolproof. Brabender has also invented a moisture tester that is semi-automatic. Only one weighing is necessary and the moisture content is read off on an illuminated scale. For determining the moisture contents of a large number of samples Brabender has a fully automatic tester that obtains the moisture figures in a continuous operation and registers them on a paper roll. It is claimed that by this device sixty tests can be carried out in an hour.

Rapid Moisture Methods

An admirable account of the recent progress in rapid methods has been published this year by Cook, Hopkins, and Geddes. Their work seems to confirm that of other workers, including the writer, that the electrical testers have their limitations. Comparison of the results obtained by the rapid analytical methods and moisture meters showed that the Brown Duvel is as accurate with hard red spring wheat throughout the entire moisture range studied as the motor driven Tag Heppenstall is over the limited range 11·0 to 17·0 per cent. At higher moisture contents, or with any of the other grains used, the former method proved superior in accuracy to any of the electrical testers. Even the 130° C. air oven proved to be more accurate than any of the meters except the motor driven Tag Heppenstall. This machine appears to be superior to any of the electrical moisture meters such as the Heilan D.K., Davis Meter, Burton Pitt, and the Limbrick, but, for some reason, the Limbrick is best for oats. The Limbrick, Heppenstall, Amine, and Davis meters work on conductivity principles. The Berliner, Rüter, and Hartman machines rely on the D.K. method—*i.e.*, dielectric constant. These all depend on the distribution of moisture in the kernel. If there is a concentration of moisture on the surface layers the reading will be incorrect. That is why none of these machines is accurate when dealing with washed wheat or freshly conditioned wheat. Brabender has developed another principle, the so-called "damping" method, which measures the moisture content in grain by measuring its damping effect on high frequency waves. This is said to be entirely independent of the distribution of the water in the berry and is claimed to measure and register the moisture content in a continuous grain stream and is quite independent of moisture distribution, of temperature, bushel weight, or fluctuations in the current. This is a discovery of great importance, as it will certainly be of enormous value in controlling the work of the conditioner. Instantaneous moisture determination would be a boon in conditioning. The writer has seen one of these testers recently installed on the conditioner in a mill at Duisberg. The mill chemist informed him that it was accurate and provided absolute control of the conditioning process. In connection with rapid moisture testing, note must be made of the work of Tucker and Burke, published recently in the *Analyst*, on the determination of moisture in cereal products by distillation with tetrachlorethane. The present writer, in conjunction with R. J. Wood, dealt with this subject in 1930, but the present work is a refinement and takes into account possible carbohydrate decomposition. The essential conditions are moderately rapid distillation and sufficient solvent to leave a mobile residue when all the water has been driven off.

(*To be continued.*)

The bottom of the suction intake pipe, shown in the previous illustration, in the hold of the ship.

Bread Consumption

Sir Charles Higham replies to Professor Drummond

In his letter, which we published last month, Professor Drummond was mainly concerned with explaining the decline in the consumption of bread which had undoubtedly been taking place for some time. But his observations on the press campaign being conducted on behalf of the Millers' Mutual Association is really another side of the question.

Sir Charles Higham is a great authority in his own field of publicity, just as Professor Drummond is in his own sphere of study. We therefore feel that Sir Charles Higham's communication on this subject, which we publish below, is of special interest to readers of FOOD MANUFACTURE, particularly when it is realised that, as he points out, the decline has already been arrested to an appreciable extent.

Obviously, what we want to do, and what we should always be aiming at, is to increase the consumption of better and better bread. And this end can best be attained by the co-operation of research worker, miller, baker and publicist.

Letter from Sir Charles Higham

SIR,

While making no pretence of professional omniscience, I hope I may claim, in all modesty, sufficient knowledge of my own business to controvert a statement made by Professor J. C. Drummond in your December issue.

Regarding it as deserving of still more publicity, and for the sake of clarity, I repeat here that part of the professor's communication with which I am concerned:

"It is to me a matter of great surprise that commercial interests have embarked on a press campaign involving enormous expense when it should have been obvious to them that the downward movement in the consumption of bread is inevitable and cannot to any appreciable extent be arrested by such efforts as they are making."

The answer is that the downward movement in the consumption of bread has already been arrested to an appreciable extent. This fact has been attested by the only people in a position to know—the millers and by bakers. In these circumstances, the professor's dogmatic assertions might well be left to harvest their own crop. Permit me to add, however, that many cases could be cited to prove that advertising can arrest and re-direct tendencies to all appearance even more inevitable than a falling bread-consumption. Doubtless, Professor Drummond would have counselled the Commercial Gas Association to retire into obscurity in view of the inevitability of electrical development!

I am now only curious to know what is the motive behind the professor's somewhat frequent excursions from his own field?

CHARLES HIGHAM.

The Society of Public Analysts

Abstracts of Papers Read on December 4, 1935

Colorimetric Analysis by means of the Photo-electric Cell. By N. Strafford, M.Sc., F.I.C.

An outline is given of the method of using the photo-electric cell in colorimetric analysis. Under suitable conditions the calibration curve is virtually a straight line and can therefore be readily constructed. Once constructed, it is always available, so that in subsequent colorimetric analysis no standard comparison solutions need be prepared. The measurements are independent of the human eye and are of appreciably greater accuracy than those obtained by the simple visual colorimeters. An example of these advantages is afforded by the use of the instrument for the colorimetric determination of lead by the diphenylthiocarbazone extraction method.

The Characters of 1935 Halibut Liver Oils. By Norman Evers, B.Sc., F.I.C., A. G. Jones, B.Sc., A.I.C., and Wilfred Smith, B.Sc., A.I.C.

The analytical value and vitamin contents of 46 manufacturing batches of halibut liver oil have been determined. Norwegian oils (from white halibut) are superior in taste and vitamin potency to oils from the blue halibut. The minimum, maximum and average "blue values" recorded during 1935 were 495, 6,300 and 1,810 respectively. Some relationship was traced between the "blue values" and the iodine values and refractive indices of the oils. The average monthly figures for the "blue values" for the 1935 oils followed the same course as those for 1934 oils, rising to a maximum in July and reaching the minimum in November.

Air-damped Balance. By W. N. Bond, M.A., D.Sc., F.Inst.P.

The advantages of the air-damped balance in comparison with other types of rapid balances were discussed. On a balance with a maximum load of 20 gm. weighings can be carried out within 50 to 20 seconds, with an accuracy of a tenth of a milligram. In weighing masses of as much as 50 gm. it is desirable to calibrate the graticule at each load. The optical system should be rigid or "changes in zero" may occur, and the scaling should be from one end of the graticule to the other. To avoid temperature disturbances, the air-damping should be at each end of the balance.

British Army's New Iron Ration

Exit Bully Beef!

IT is interesting to note in connection with the answer to Enquiry 1948, which was published on page 412 of our November 1935 issue, that the information given was not quite accurate.

We are now informed that the emergency ration will be a milk chocolate, made of pure cocoa, cocoa butter, milk protein and sugar which is made into an 8 oz. cake contained in an airtight tin 3½ in. by 3½ by 1 in. This information is based on facts secured from the War Office, where it is estimated that this ration will be sufficient to sustain life for 48 hours. The tin is to contain four foil-wrapped blocks and is to be sealed with a soldered strip of tin round the edge, which is peeled off with a key.

We understand that it was only after months of experimenting that the War Office decided upon this change, and a considerable amount of research work has been done to determine the nourishing values of different foodstuffs and the vitamin content which plays such an important part in the maintenance of health. Cocoa has apparently come out very high in some of these tests, and presumably its compactness and ability to keep in good condition for a long period have also contributed to its selection.

The change will probably be popular with the Forces, for the sales of chocolate through the N.A.A.F.I. (Navy, Army and Air Force Institute) are literally enormous. This is said to be equivalent to 65 bars and 22 blocks (presumably a quarter pound) per man every year.

SOME BOOKS OF THE YEAR

The Advance of Biochemistry

Biochemistry gathers momentum as it rapidly advances. Indeed, its rate of progress is a continual matter of astonishment to those of us who made our chemical studies some 30 years ago. In those days it was regarded as a sort of freak department, of no particular significance, sandwiched in between chemistry and biology. At Cambridge, we remember, the place where it was housed was rather difficult to find, and when one did find it there was not much of it. In that respect it was not much better off than mineralogy. But look at the difference now!

The output of research in biochemistry has reached prodigious proportions, and, of course, it has been split up into many specialised fields with their own bands of specialised workers. One inevitable result of this is that the specialist runs the danger of losing track of the general advance of the subject as a whole, although it is obviously important that he should not do so. Hence the advantage of having at his disposal a work which annually reviews the entire field of biochemistry, thus providing, in addition, a convenient source of information plus references without involving the expenditure of time which would otherwise be involved in hunting through a mass of scattered literature.

We have before us the fourth volume of the *Annual Review of Biochemistry* (1935). It runs to 640 pages and covers 27 of the main fields of biochemical research. The outstanding developments of the year are summarised.

In the few years since this useful annual review was started, it has become an indispensable guide to biochemical workers. The highly condensed information which it contains enables them to keep in touch with the subject as a whole in a way that is not provided for by any other means.

H. B. C.

Annual Review of Biochemistry. Edited by James Murray Luck, Stanford University, California. 1935. *Price* $5.

Fundamentals of Biochemistry in Relation to Human Physiology

Another publication which has achieved a considerable measure of success is Parsons' well-known *Fundamentals of Biochemistry in Relation to Human Physiology*. We have reviewed the earlier editions of this work; now it is in its fifth edition, although it is only twelve years ago when the first made its appearance. This is certainly ample testimony of its popularity.

The chief merit of this work, in our opinion, lies in the attractiveness with which an exceedingly complex and difficult subject is presented. Mr. Parsons can write well; his style is lucid, as well as entertaining—yet he keeps closely to facts. This is a gift which all too few scientists possess, and that Mr. Parsons happens to be a biochemist is indeed fortunate for students of biochemistry.

In spite of the rapid exhaustion of the fourth edition of this book, sufficient advance has been made with the subject to necessitate the re-writing of several sections. In particular, a new account of muscle chemistry has been included, and the section on sterols has been enlarged to deal more adequately with our rapidly advancing knowledge of this important group of substances. Other chapters into which changes have been introduced are those on vitamins and on tissue oxidations. But the original aim of the book has been carefully preserved so that it still forms an introduction to the subject of biochemistry for students of medicine and science—an introduction, moreover, in which an attempt has been made to express the intrinsic interest of the subject in the manner of its presentation.

H. B. C.

Fundamentals of Biochemistry in Relation to Human Physiology. By T. R. Parsons, B.Sc., M.A., W. Heffer and Sons, Ltd., Cambridge (1935). *Price* 10s. 6d. *net.*

Physical Chemistry in Industry

To pursue to its extremity any one of the manifold branches of that section of science conveniently referred to as physical chemistry is a privilege that is enjoyed only by a few academic gentlemen and not many more highly specialised workers in industry. Compared with these there are, undoubtedly, large numbers of other scientific workers with less restricted interests who find it necessary on occasion to borrow from the specialists. Hence the value of a series of works of reference dealing with the several branches of physical chemistry and, in particular, those which have a more than ordinary significance in industrial practice.

This need has fortunately been met by the publication of a series of Monographs of Applied Chemistry, and the two latest examples before us are Glasstone and Hickling's *Electrolytic Oxidation and Reduction*, and the second edition of Radley and Grant's *Fluorescence Analysis in Ultra-Violet Light*. Previous volumes of this series have dealt with subjects such as artificial silk (Wheeler), catalytic processes (Hilditch), hydrogen ions (Britton), solvents (Durrans), protective films on metals (Hedges), fruit preservation (Morris), and conductometric analysis (Britton). We see—and this is a matter of considerable interest to food technologists—that Dr. Davies is writing a book dealing with the chemistry of milk.

With reference to electrolytic oxidation and reduction, the authors state that their book is not merely a compilation of these processes carried out by electrolytic methods, but that a serious attempt has been made to elucidate, as far as possible, the underlying principles of the reactions described. They also speak of the enormous possibilities of electrolytic methods in manufacturing processes, and this is quite understandable, seeing that electricity makes available a clean and controllable method of bringing about oxidation and reduction, and even of halogenation and the introduction of various groups into organic molecules. An examination of the references to patents in the book certainly indicates the large extent to which these processes have been applied in practice, such as in the manufacture of iodoform, bromoform, cyanate, persulphate, perchlorate, perborate, permanganate, ferricyanide, hydrogen peroxide, and also of dye intermediates and other purely organic compounds. It is interesting to note in this connection the statement made a few years ago by an American authority that " It will probably be difficult, if not impossible, to cite another branch of applied science in which such extreme reticence has been maintained ". This makes Glasstone and Hickling's contribution all the more welcome.

The other book, on fluorescence analysis, has probably a broader sphere of usefulness; at least, its main appeal is to laboratory workers in general. Fluorescence methods for analytical purposes are not so novel that their worth to the

analyst has lacked mature appraisement. On the whole it would appear that if applied with discretion and under standard conditions, fluorescence analysis is a most valuable aid to the scientific worker, especially in routine work or sorting tests, ordinary testing or analytical methods. Certainly the extraordinary variety of products to which this method of analysis can be applied justifies the publication of a comprehensive work on the subject. A chapter is given to foods and food products, for example, and there is another devoted to drugs. Indeed, it would appear that there is scarcely a branch of industrial chemistry which fails to provide opportunities for the exercise of this form of testing work. The authors have covered their ground thoroughly, so much so that there is little doubt but that their book is to be regarded as the most authoritative work on the subject.

H. B. C.

Electrolytic Oxidation and Reduction. By S. Glasstone, D.Sc., Ph.D., F.I.C., and A. Hickling, M.Sc., Ph.D. 1935. *Price* 25s. *net.*

Fluorescence Analysis in Ultra-Violet Light. By J. A. Radley, B.Sc., A.I.C., and Julius Grant, Ph.D., M.Sc., F.I.C. 1935. *Price* 21s. *net.*

Both edited by L. Howard Tripp, Ph.D., and published by Chapman and Hall, Ltd., London.

Emulsions

Chemists and men of science whose work or interest brings them into contact with any of the manifold aspects of colloid science need no introduction to Dr. William Clayton's *Theory of Emulsions and their Technical Treatment*, first published twelve years ago and now appearing in its third edition. When a technical work has been translated into German and Russian, as has this particular one, its author should feel well satisfied with his achievement. In other words, the *Theory of Emulsions* has come to be internationally recognised as the standard work on the subject, so that whatever we may say in praise or otherwise does not really count one way or the other.

Whenever we take up any of the numerous contributions made by Dr. Clayton to scientific literature we are always appalled by the enormous number of facts and views, coupled with their references to original sources, which he presents. There is no padding. It is all rich, concentrated stuff—a bit indigestible perhaps—but, still, there it is for you to dilute down to the strength that suits you best. *Theory of Emulsions* does not break Clayton traditions; it is really a work of reference—a compendium of facts and observations, such as cannot be found elsewhere; hence its universal appeal and the reputation it has earned as the source to which one can most safely and conveniently apply for information on any question concerned with emulsions. It is, in fact, the very last word on emulsions.

This present edition—it is now seven years since the second edition came out—makes it necessary for those who have previous editions to scrap them and buy the new one. This last production is over double the size of the previous one, which means that it has been entirely rewritten to include the enormous amount of data which has accumulated in the course of the past seven years. We notice also that a considerable number of new illustrations have been added, and another very useful feature, which has previously escaped our notice, is the elaboration of the author index by inclusion of short references to subject matter under the various names of the authors.

H. B. C.

The Theory of Emulsions and their Technical Treatment. By William Clayton, D.Sc., F.I.C., Chief Chemist and Bacteriologist, Messrs. Crosse and Blackwell, Ltd. (London). Third edition. 458 *pages and* 91 *illustrations. J. and A. Churchill, Ltd., London.* 1935. *Price* 25s.

Fruits and Vegetables

Their Structure and Composition

There is no branch of applied science unless it be the chemical and perfumery industries which concerns itself with raw materials in such numbers, diversity and complexity as do the food industries. At least, such would be the thought occurring to anyone turning over the 900 pages of the Wintons' second volume on the structure and composition of foods. Many will, no doubt, recollect the first volume which appeared in 1932 and which covered cereals, starch, oil seeds, nuts and forage plants. This book ran into 710 pages, and was remarkable for the amount of detailed information which it contained. There is still a third volume to come, which will deal with milk, meat, fish, eggs, sugars, tea, etc., and, when it does, the Wintons will have placed in the hands of food technologists a body of accurate, fundamental data which is unequalled, even approximately, by anything that has been compiled in the English language.

The present volume embraces fruits, vegetables and legumes, and, as indicated above, its joint authors are Andrew L. Winton, Ph.D., sometime State and Federal Chemist, and Kate Barber Winton, Ph. D., who was at one time Microscopist to the State and Federal authorities. No doubt they had unique opportunities for the accumulation of data at the time when they occupied these positions; certainly, judging by results, they have made the most of these opportunities, for the information which they have presented in their books relating to structure and composition is evidence of painstaking effort on a remarkably elaborate scale. For this they will reap the gratitude of food technologists the world over as, even from our own limited experience, it is a most difficult business, and one which usually involves a search among widely scattered literature, to dig out reliable information about matters of so fundamental a nature as structure and composition—particularly where fruits and vegetables are concerned.

The contents of this work follow the uniform plan adopted in the first volume. Naturally, clear and systematic arrangement is a primary requisite in a compilation of this character and in this respect no one would have the slightest doubt but that the Wintons have that faculty for arranging and classifying their facts in a neat and orderly style which is the distinguishing mark of the systematic naturalist. After a general description of distribution and so on of a particular species or variety, macroscopic structure, microscopic structure, and chemical composition are dealt with in turn. Adequate references are given and there is an abundance of line drawings and tables. Altogether a splendid piece of work!

H. B. C.

The Structure and Composition of Foods. By A. L. Winton and K. B. Winton. Vol. II., 904 *pages and* 303 *illustrations by the authors.* 1935. *John Wiley and Sons, Inc., New York, and Chapman and Hall, Ltd., London. Price* 75s. *net.*

The Saga of Coffee

The romance that lies behind that ordinary everyday commodity coffee is unfolded in *The Saga of Coffee*. It is a biography of coffee, coffee-houses and coffee drinks, and at the same time it is a record of three centuries of world history from a new point of view. In Paris, Vienna, Berlin, Sumatra, Java, Brazil, wherever coffee has been raised or consumed, the author has searched the records, and he has produced a book that reveals the clear thread of a custom running unbroken through three hundred years.

Down to 1850 the historian of coffee is chiefly concerned with consumers, but from the middle of the nineteenth century onwards production was so mightily increased that

attention is perforce directed towards producers. The story of coffee in comparatively recent times denotes the dictatorship of Brazil, which country in 1906 produced 97 per cent. of all the coffee grown in the world.

Coffee planting is believed to have been first introduced into Brazil about 1726, and the three main factors which combined to promote the victory of Brazil as a coffee-producing country were the soil, the form of government and local labour conditions. In Sao Paulo, the centre of the coffee region of Brazil, the land was easily cleared and was found to be exceptionally suitable. Under Pedro II the industry was encouraged by wise development of the country and road and rail building. Labour was cheap, as it was slave labour down to 1888 and after that date the large number of immigrants maintained the necessary supply. These factors, the author points out, enabled Brazil to take the lead as the premier coffee-producing country in the world.

When it comes to dealing with the economic causes of the various crises that have from time to time descended on Brazil as a result of " over-production " of coffee, Herr Jacob is not on such safe ground. His ideas on the Law of Marginal Utility, as well as his opinions on free-trade, are, to say the least, surprising and original. Again, in trying to justify the action of the State of Sao Paulo with its " valorisation " of coffee scheme of 1906, the author uses a rather confused argument. First of all he justifies the " valorisation " scheme by stating that the coffee harvest was so large in that year that unless the Government had purchased stocks the world price would have fallen to a farthing a pound. Shortly afterwards he justifies Government purchasing on the ground that speculators corner the market in order to keep up prices and make profits. He even makes the surprising statement that this would have happened in the present case. If that is so why did the São Paulo State take upon itself the financial risk involved when a group of speculators was prepared to do it? The result in either case would be the maintenance of the price for some time at the expense of the consumer.

As a history of coffee, however, the book is extremely interesting and the expressions of opinion on economic matters are not vital to the subject. In addition a number of fascinating illustrations enhance the value of the book : they include paintings by old masters, political cartoons of earlier days, satirical sketches, etc.

R. D. V. R.

The Saga of Coffee. Heinrich Edward Jacob. Translated by Eden and Cedar Paul. 1935. *George Allen and Unwin, Ltd.* 15s.

A Handbook of Chemistry and Physics

The twentieth edition of this Handbook of close on 2,000 pages has just been issued with new and valuable features, and the care with which the data is selected, arranged and printed is self-evident to anyone who has to refer constantly to such works for physical as well as chemical information of an obscure, or even ordinary, nature.

It is twenty-two years since the first edition appeared, and with the publication of twenty editions in that time much information has been accumulated and added. New and revised material in this edition includes the new table of Physical Contents of Organic Compounds, the most important feature of which is the Nomenclature worked out by Dr. Austin M. Patterson, who is Vice-President and Professor at Antioch College (U.S.A.). Mr. Patterson has for a number of years been a member of the Committee on Organic Nomenclature of the International Union of Chemistry and is a leading authority on this subject. As far as possible, the publishers explain, every organic compound has been named in accordance with the rules laid down by the International Union, those not covered by the rules being named as nearly in accordance as possible.

This Table has now been changed from the tabular style to the dictionary style. All the data for each item is thus in one paragraph half a page wide. This certainly makes reference much easier than having to read across a column of figures which are very close together, and it does, in fact, reduce the liability to error in reading a series of figures set in tabular position. The symbols for different properties have been repeated in each paragraph, but they should be easily memorised, and as they are printed in bold type they are readily distinguishable from the figures beside them. This is undoubtedly a good idea. Over 5,000 compounds are covered.

A Formula Index of Organic Compounds and a Collection of Tables giving the properties of the Amino-Acids are additions in this issue, whilst sections which have been revised or extended deal with X-ray Spectra, Magneto-Optic Rotation and Colorimetry. The Pronunciation of Chemical Words, Rules for Naming Organic Compounds and Prefix Names of Organic Radicals are subjects also receiving appropriate attention in this handbook.

G. W. L.

Handbook of Chemistry and Physics. Editor-in-Chief, Chas. D. Hodgman, M.S., The Chemical Rubber Publishing Company, Cleveland, Ohio. 1935. *Pp.* 1,966. $6.00.

Chemical Documentation

A document about chemical documentation services has been inspired by the International Union of Chemistry at the Hague and the International Office of Chemistry, created by that Union, has produced a volume printed in three languages—French, English and German—setting out particulars of the representative bodies in various countries through which researches into scientific literature can be conducted.

This is, perhaps, a misleading statement, since membership of research associations and learned societies is generally essential before the services can be utilised. There is also a peculiar inadequacy about the information in this first edition, so far as Great Britain is concerned, at any rate. The organisations mentioned are only nine in number, many that are well known being left out. The Iron and Steel Institute is included, but not the Institute of Metals. Of the research associations, only the organisations of the Cast Iron Research Association and the British Rubber Manufacturers' Association are described. What about Non-Ferrous Metals, Wool, Cotton, Canning, and so on?

The lengthy preface by Lean Gérard is not at all explicit, at least in the English language it is not, and in one paragraph towards the end of it he says, " To be sure, the enquiries made by the Office have not brought to light all the existing centres of documentation. The putting into circulation of the first edition of the Repertory may be expected to reveal a certain number of others which it will be profitable to include in a subsequent edition." It would certainly seem to be of little use without information concerning at least three times as many important organisations as it acknowledges at present. This cannot require any revelation. The names and particulars of the missing organisations from this country are well enough known to everyone in the scientific world, and particulars like those published in this volume concerning them all would be of considerable international value.

The intention is a good one, but it is difficult to appreciate why such a large amount of space should be wasted in a very large book which only covers a few of the available services. The information about each service gives the Legal Standing, Address, Date of Foundation, Chief Objects, Special Subjects, Management and Staff, Rules and Regulations, Available Documents, Resources, Classifications of Literature and Publications issued. The price is not mentioned.

G. W. L.

International Repertory of Centres of Chemical Documentation. Office Internationale de Chimie, Paris. 1935. *English, French and German. Pp.* 114. 12″ × 8″.

The Conference on

The NUTRITIVE VALUE of CANNED FOODS

(Continued from December Issue)

The Importance of Mineral Salts

By F. Hirst, M.Sc., A.R.C.S., Director of the British Canning Research Station at Campden

Mr. Hirst reminded his hearers that until a few years ago large numbers of the population of this country considered themselves fortunate if they had sufficient food to satisfy their hunger. They now knew, however, that there were other factors apart from sufficiency and that the kind of food they ate might have an influence upon their health. Indeed, it might be said that the discoveries of physiologists and biochemists had revolutionised their previous conceptions of nutrition. Nowadays it was realised that an adequate diet must supply suitable proteins, carbohydrates and fats, it must furnish liberal supplies of vitamins, and it must possess the necessary mineral salts in correct proportions.

Mr. F. Hirst, M.Sc., A.R.C.S., Director of the British Canning Research Station at Campden as seen by our caricaturist, when he was delivering his paper at the Conference.

Mineral Salts

That morning they were considering canned foods from those aspects. As pointed out by Dr. Cronshaw in opening the discussion, the question of proteins, carbohydrates and fats need not be emphasised, as it was generally accepted that their values were as high in canned foods as in the corresponding foods cooked in the home. The question of vitamins had been adequately dealt with by the other speakers, and all that remained for him was to say a few words about mineral salts, which, while not so much in the public eye as vitamins, were, nevertheless, of some importance. To illustrate this one had only to consider the element iodine, and the connection between an adequate intake of this substance to the incidence of goitre was now generally recognised. In some parts of the world where the soil was deficient in iodine the food produced on the land contained practically none, with the result that goitre was very widespread. Reference was also made to feeding experiments on rats, which had shown that with these animals rickets might be caused by a deficiency of phosphorus.

Mineral salts were found in the body chiefly in the skeletal structure, where they accounted for over 20 per cent. of the moist tissue. They were also present in all living cells and they helped to keep the body in a normal alkaline condition. They also fulfilled important functions in connection with the blood, the digestion and in many other ways. The elements known to occur as regular components of animal cells were calcium, magnesium, sodium, potassium, iron, sulphur, phosphorus, chlorine, and iodine. Traces of several additional ones may often be present, but whether they are all necessary for normal nutrition is not at present known.

Generous and Varied Diet Required

The mineral salts were being constantly lost in the excreta, and the supply of each had to be made good by the food consumed. There was very little information regarding the proportion in which the several elements were retained by the individual, but it would appear that the amount depended not only upon the quantity present in the food but upon other factors, such as the proportion of vitamins, carbohydrates, and, perhaps, proteins consumed. It was now well known that vitamin D was more effective when lime salts and phosphates were well supplied in the diet. The available information indicated that a general and well-varied diet would contain enough mineral salts for the average individual. The salt employed in cooking most foods provided considerably more sodium and chlorine than was necessary, while magnesium and potassium were present in meat and many vegetables. Calcium and phosphates were present in milk, eggs, vegetables and fruits; iron and sulphur were also present in many common foodstuffs, and iodine was a constituent of most sea foods.

Mineral Salts and Vegetables in Cans

The excellent canned vegetables now available during the winter months, when there was little fresh material available, enabled anyone to ensure an adequate supply of some of the necessary inorganic salts. One aspect of the question which had been receiving attention during recent years was the loss of mineral salts in the cooking of vegetables, and the loss was undoubtedly material, amounting in some cases to as much as 50 per cent. of the total amount present. In the canning of vegetables there would also be losses, but as far as could be ascertained their magnitude had not been determined. They should, however, said the lecturer, be less, if anything, than those in home cooking, as only a

minimum quantity of covering liquid was added to the vegetables in a can, and any salts extracted during the process of sterilisation must, of necessity, remain in the can, which was hermetically sealed before heat was applied.

General Health Improved

There could be no doubt that the general health of the people of this country had improved during the past twenty years, despite the fact that during this period the consumption of canned foods—which were so often condemned by those who had not studied them—had rapidly increased.

It could not be denied that canned foods supplied the variety in the diet so necessary for good health, and, as they had heard from the other lecturers that morning, the nutritive value of the food was very little impaired by the canning process. The importance of preserved food in the dietary of the people of this country could not be better expressed than it was a few years ago by Sir James Crichton-Browne, one of their leading physicians, when he said, referring to the improved health of the people: "No small part of the improvement thus referred to has been in the quantity, quality and variety of preserved foods. These have largely contributed to the health and energy of the English people of all classes. Without them the physique and potency of our people would be nothing like what it is to-day, and disability and malnutrition would have been vastly more widespread than, unhappily, they still are. The consumption of preserved foods has now reached gigantic proportions in all civilised countries and they have proved an incalculable boon and benefit. The process of preservation has made accessible to the poor viands which were formerly the luxuries of the rich. The attempts sometimes made to deprecate preserved foods and to create prejudice against them are foolish and mischievous."

That statement, concluded the lecturer, from a medical man who had no connection with the industry, certainly went a long way towards corroborating all the claims which had been put forward that morning in favour of canned foods.

The Discussion

The Chairman, Mr. A. LL. Matthison, in inviting questions, described the papers given as a very valuable and comprehensive contribution to the all-important question of the nutritive values of canned food. He hoped that they would be published verbatim in the trade press. He congratulated the National Food Canning Council upon having called together the most representative gathering of food chemists in the history of the organisation.

Mr. Black opens Questioning

The first question came from Mr. Black, who said he had been very interested in one statement made by Miss Olliver in the course of her paper. She had stated that vitamin C increased with the ripeness of the vegetable or fruit. He was browsing quite recently through some information on this point when he came across a statement by an American dealing with canned peas. He had said that nearly all the early peas were a very much more valuable foodstuff than the ripe peas, even if they obtained them fresh. If that was so it was a very valuable point in the canning of peas. Even so there was a remarkable difference of opinion. Dr. Cheftel had conducted a series of experiments which were very useful to the canner. It had been suggested that the advantages shown by canned foods might be due to the liberation of some properties which were not so easily liberated in the raw foods.

Mr. Samson described the papers as "very valuable and so full of discussion and controversial points" that he could fire questions at the lecturers for the rest of the afternoon. He did feel, to raise one point, that too much of the discussion had centred around vitamin C. He felt that this was the vitamin that they should least fear. Personally, he would have been interested to hear more about vitamins A and B, but as he would imagine that the quantity of these vitamins in canned fruits and vegetables was not of the same proportions as C, he supposed that they could not expect it. That vitamins were destroyed to some extent in canned foods they did not dispute, but they were also destroyed to a greater extent by domestic cooking. That was a point which, in his opinion, should be brought home more clearly and forcibly to the public. Another point was that he felt that they could not place too much reliance on animal experiments carried out with raw food, which was their natural food, as against canned food, which was artificial. If they could only conduct experiments on man he thought the results would be even more striking than those obtained by Dr. Cheftel, with the aid of his guinea pigs and rats. He thought also that they were apt to stress vitamins too much. They were helping to commercialise vitamins. He felt, with Dr. Hirst, that mineral salts played a very important part in the health of the people, and there was a danger of their losing sight of the real value of mineral salts. Let them take, for instance, copper. He felt that copper played a very important part —not to the extent, of course, that a medical man would consider dangerous—but in small portions. It played, in his opinion, along with manganese and other metals, as important a part as vitamins. They canned their foods and they claimed that their foods were sealed against atmospheric infection, and they served them out to the housewife containing as much vitamins as possible, and then on the label they advised the user to take the lid off and heat the contents. They were simply asking them to destroy whatever vitamins there were in the contents of the can. They should advise them to heat the can with the lid on, just as it had been received from the factory. In conclusion, he said that he felt the question of the nutritive values of canned foods was long overdue for discussion. However, the lecturers that afternoon had set the ball rolling. He hoped they had been able to stimulate interest and that the good work would go on.

Mr. Morris said that they had carried out a little work at Cambridge on the question of vitamin C in apples, and the results had very definitely confirmed the statement that it was necessary to exclude air. They had also discovered that the peel of the apple was exceptionally rich in vitamin C, and he thought that this might be made use of in canning. When desired one could bring up canned fruits to any standard of vitamin C content as was deemed necessary.

Mr. Atkinson, of the Ministry of Fisheries, Lowestoft, put a question to Dr. Cronshaw arising out of his point that the canners caught the fruit crop at its best. Was that point being dealt with in respect of canned herrings? he asked. Herrings were undoubtedly the principal fish used in this country. Taking the average supply, they knew that as the sun got higher and the accumulation of sea food had passed into the roes, it was during the late autumn—during the famous Yarmouth herring season—that they obtained herrings in their best condition. It had been stressed that herrings canned at this time of the year were very much better than fresh herrings which they had to eat at other periods of the year when they were in very inferior condition and quality, and, incidentally, much higher in price. It could not be too strongly emphasised from the public point of view that canned herrings were always better food value than the fresh herring taken from the sea during the earlier months of the year.

Mr. Thompson, the next questioner, said he did not think that the average person should trouble much about vitamins. He thought that Cardiff should be an ideal centre in which to investigate the e[illegible] of canned foods on seamen making long voyages in and out of the port. Anyone who had gone to sea in the old days and made the acquaintance of salt junk from the "harness" cask would turn with relief to a diet of canned foods. And there was no doubt at all about it but he received infinitely more nourishment from the canned foods than he did from the salted pork. He wondered also whether there was any information available regarding the contamination—he was almost going to say can-tamination —of food supplies during the ordinary process of domestic cooking. Perhaps Dr. Cronshaw might be able to help them in this respect. It would be very interesting to know how much the process of cooking enabled them to keep the vitamin content as high as possible.

Mr. Hartley Woodcock, in formulating his question, submitted the theory that people would not buy a particular foodstuff because it contained a recognised proportion of vitamins or mineral salts. They ate mainly those things which attracted them by appearance. He thought it ought to be possible to measure the difference of assimilation between foods which were naturally served and those presented in attractive forms. How much more nutriment was derived from food which, being canned, was attractive in flavour and colour, and how much less from food from which the colour had been depreciated by domestic cooking? That, he thought, should provide a very useful and interesting source of investigation.

Miss Olliver, in replying to Dr. Black's question regarding vitamin C in peas, said that perhaps she should have made it more clear that she was referring particularly to fruits when she had mentioned the rise in vitamin C content with increasing maturity. They had found that younger peas were higher in vitamin C than the older type of peas which were mostly used by the housewife for domestic cooking. Mr. Samson had drawn attention to the fact that she had mainly referred in her lecture to vitamin C. As fruits and vegetables were the main source of vitamin C she had felt justified in confining her experiments to that one vitamin.

Dr. Cheftel, in replying to his questioners, said that, if vitamin C had been more particularly referred to in his notes on experiments undertaken it was because that was the particular ground on which canned foods had been attacked, and it was highly important that they should glean all the knowledge that they could on the matter. In their experiments with rats, however, they had not taken vitamin C into consideration at all, because the animal was not sensitive to scurvy. Mr. Samson had suggested that experiments conducted on animals were not so reliable as those carried out on man. As he had pointed out in his lecture, however, he had used animals which were much more sensitive than man. This gave them a margin of safety. Mr. Thompson and Mr. Samson had raised the point of metals in food. He did not quite know what the inference might be, but he had occasion some time ago to study some canned foods which had been stored for more than a year and he had found them to contain in every case the required quantity of vitamins. There was one metal very often present in factories and which had a destructive effect upon vitamin C, and that was copper. In France housewives were still allowed to use copper utensils for cooking vegetables, and it was a fact that the vegetables so cooked did not contain any vitamin C at all. The practice, however, was fast disappearing, fortunately for the health of the people. In reply to Mr. Woodcock, who, he said, had raised a very interesting question regarding the relative values of food which was attractive to the eye and that which was cooked by the housewife to the detriment of its attractiveness, he agreed that there was undoubtedly a great difference in the nutritive value of a food which was attractive to the eye and one which was less attractive. Experiments in this direction, however, were very difficult because there was no measure available.

Editor-in-Chief of "Food Manufacture" Replies

Dr. Cronshaw, replying, said that Dr. Cheftel's concluding remarks to Mr. Woodcock regarding the influence of psychological factors upon the assimilation values of food recalled to mind that the only work he could recollect having been done in this country was that done recently by Dr. McCance, of London University. Dr. McCance read a very interesting paper some time ago on the subject and he would like to refer Mr. Woodcock to that paper. It might be possible to persuade Dr. McCance and his colleagues to extend their work to canned foods. It was an extremely difficult problem to tackle in actual practice.

He rather fancied that the gist of Mr. Atkinson's complaint was that there had not been much work done regarding the variation of nutritive values of herrings for the different periods of the year in which they were caught. Experiments had been carried out on this subject in Germany, Norway and Western America. He could only refer him to the wonderfully detailed studies which had been made at those stations regarding the variations in the nutritive values of fish from season to season. A check was constantly kept on the value of such factors as iodine content, not only according to the changing seasons but also with respect to the geographical distribution of the fish, which were collected from various fishing grounds and analysed regularly.

Vote of Thanks

Sir Edgar Jones, moving a vote of thanks to the lecturers, said they had pushed forward that day work on the nutritive values of foodstuffs which was not only most interesting but particularly valuable in that it proved a definite step forward in the important work carried out by the eminent doctors who had lectured to them that day. Dr. Cronshaw, through the medium of the valuable journals which he edited, had been educating them for years. Dr. Cheftel left him astonished, not only for the exacting nature of his experiments, but for the extraordinary clarity with which he was able to think in English. He (the speaker) being a bi-lingual person, speaking Welsh and English, was never quite sure in which language he could think best. Another thing that had interested him in Dr. Cheftel's contribution to the discussion was the way in which it recalled to his memory the occasion, six years ago, when Dr. Picey first came over to tell them that he had been asked to undertake in France experiments and investigations affecting the canning industry. Ever since that day he and his colleagues had attended all their canning conferences. They had to congratulate Dr. Picey and his staff on the great strides which they had made during recent years.

Sir Edgar Jones also warmly congratulated Miss Olliver upon her excellent paper and also Mr. Hirst, who, he said, was always with them. It was very gratifying to note how this question of international collaboration was making such excellent headway. At an international Conference of which he happened to be chairman it had been decided that all the research and information of the various countries compiled on this great question of food values should be pooled. Germany and Norway (very important on the fishing side), Italy, France, America, and possibly other countries, were all going to work with Great Britain until they had brought together a great mass of information on the question sufficient to crush any crack-brained opinion still alive, with the great weight of expert opinion. He felt that they should not be in too great a hurry. They should be certain that they had good solid cannon-balls of fact that no one might be able to withstand, and when they had got them they should fire them with all the power they could command.

The point of experimenting on animals, which had been raised during question-time, reminded him that their opponents had been using so-called experiments on animals to try and destroy them for years past. If they (their opponents) were going to produce experiments on animals as the foundation of their arguments it was necessary for them to conduct their arguments along the same lines by experimenting also on animals. The important thing for them was to seize hold of what they were proposing to do at the moment. The purpose of that discussion had not been so much to deal with the public—they would deal with the public later, when the time was ripe—as with the doctors and chemists. They were more concerned with the doctor just now, and still more with the nurses and others who were still able to influence the minds of the public, and it was their object to continue to interest them more and more. What they were attempting at the moment was a mobilisation of facts and figures sufficiently weighty to convince these people. They had to press onward to secure that overwhelming opinion both in this country and abroad, and when they had got it they would take care that no doctor, nurse or chemist would be left neglected. They would find the necessary money to use as ammunition as soon as the time was ripe and the people had been educated to interest themselves in health matters.

Mr. Wilkinson, in seconding the vote of thanks, said that not only would he like to see the papers delivered that morning reported fully in the press, but also produced in pamphlet form.

The motion was carried with acclamation and the morning session terminated.

INDUSTRIAL NEWS

Economic and Trade Conditions in Australia

The improvement in general trading conditions during 1934 continued during 1935, in spite of the unfavourable position of the producing industries, states a report on the Economic and Trade Conditions in Australia, issued by the Department of Overseas Trade. During the year 1933-34 the total imports of Australia in the class "Foodstuffs of Animal Origin" increased from £799,859 in 1932-33 to £942,686. Imports from Great Britain were £223,575, including £218,065 representing "competitive" trade and £5,510 "non-competitive". In the class "Foodstuffs of Vegetable Origin; Non-alcoholic beverages and substances used in the making" a large proportion of the trade comprises "non-competitive" products such as grain, fruit, tea, coffee, etc. The total value of imports for the whole class increased from £2,330,791 in 1932-33 to £3,141,432 in 1933-34. Imports from Great Britain were £149,842, including £132,498 of the "competitive" trade and only £17,344 out of £2,960,213 of the "non-competitive".

As well as trade, chapters are included dealing with finance, production, tariff questions, transport and communications, legislation, and social conditions.

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[*With acknowledgments to the "Daily Herald."*]

The lighter side of food production—a photograph taken on the stand of Spillers Ltd., at the Health and Beauty Exhibition which was held at the New Horticultural Hall, Westminster, from November 29 to December 6. As can be seen from the illustration, this firm were exhibiting their new Turog fruit loaf.

The Leipzig Fair

In order to facilitate the work of the German Commercial Information Service of the Leipzig Fair, which was instituted for the benefit of exhibitors and buyers at the Fair, the London Office of the Leipzig Fair has moved to larger and more conveniently situated offices. The new address is: First Avenue House, High Holborn, W.C. 1, rooms 426-8 on the third floor, and the telephone No., Holborn 1408-9.

The dates of the Spring Fair have been fixed as follows:

General Samples Fair, March 1-6. Great Engineering and Building Fair, March 1-9. Textile and Clothing Fair, March 1-4. Office Equipment Fair, Furniture Fair, and Sports Goods Fair, March 1-5. "Bugra" Machine Fair (for the printing trade), March 1-7.

New American Director

When Mr. R. Righton Webb, treasurer of W. J. Bush and Co., Inc., New York, returned on September 22 to New York after his annual visit to Europe he was accompanied by Mr. E. L. Bush. Mr. E. L. Bush visited the United States and Canada. Mr. Bush has been elected a director of the American company, succeeding the late Alfred W. Bush. He has been a director of the British company for some time.

Paris International Trade Fair

The Paris International Trade Fair (Foire de Paris) will be held in 1936 from May 16 to June 2.

By the end of October, practically all the available space in the principal sections of the Fair had been booked up again. It has, however, been possible to acquire additional ground to supplement the 400,000 square metres in the Exhibition Park itself, so that it is hoped that no applications will have to be refused at the forthcoming Fair through lack of space.

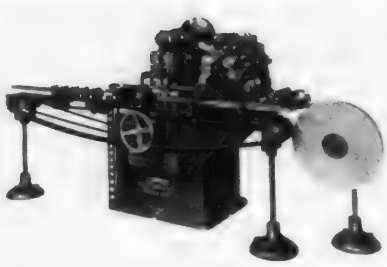
"Staybrite" Exhibits at the Applied Arts and Handicraft Exhibition

From huge Chemical Vats to the most delicate Surgical Instruments the corrosion-resisting qualities of "Staybrite" steel are extending its useful applications. A recent example was to be seen in London in a collection of beautiful things, designed and produced by the age-old handcraft methods, in "Staybrite" steel, by Mr. Hugh Wallis, of Altrincham, Cheshire. This collection was shown on his stand at the Applied Arts and Handicrafts Exhibition held at the New Burlington Galleries, from December 5 to 19, and to those who only know "Staybrite" polished to the hard brilliance which is necessary where freedom from corrosion is the only reason for its use, it was a revelation to see the delightful effects obtainable when this metal was finished with a beautiful semi-polished, silver-like surface and worked into beautiful forms for all sorts of things, from simple little Ash Trays and Butter Dishes to large and elaborate Mirror Frames, Fire Screens, and Reading Lamps.

Mr. Wallis has proved in the short time that he has been working in "Staybrite", that it is a metal not only easily manipulated by the handworker, but one of great beauty when used by an artist sensitive to the requirements of his material, and one that, in colour and texture, harmonises perfectly with most modern interior decoration.

Weeding Out the Unfit from the Food Trade

One clause in the Bill which is to be promoted by the Liverpool Corporation in the next session of Parliament, seeks to give authority to the Medical Officer of Health to prevent any person suffering from advanced tuberculosis from engaging in the handling of foodstuffs intended for consumption by persons other than himself and household. If the Medical Officer certifies that the employment of such a person is detrimental to public health, the Corporation may request that employee to stop his employment, and if it thinks fit, may make compensation to him for any loss he may sustain. Should the employee decline to obey the order, the Corporation may take proceedings in a court of summary jurisdiction and obtain a magistrate's order to secure the desired result.



The Number 99 Paper Disc Inserting Machine of the Cameron Can Machinery Company. The paper disc is inserted in the can body and the top edge is false-wired, sealing the paper to the top of the can. The can is also covered with a threaded lid or screw cap.

British-Italian Trade

The Italian Chamber of Commerce in London has issued a special supplement to its journal entitled "Italy as a buyer from the British Empire". In this is shown the trade figures of Italy with Great Britain, and with various parts of the Empire. Attention is drawn to the fact that for some time British-Italian trade has been in favour of Great Britain.

The chief foodstuffs imported from Great Britain to Italy appear to be cured fish (herrings), spirits and candy and refined sugar. From the Dominions, however, Italy has purchased a considerable amount of foodstuffs, including frozen meat, etc., from South Africa and Australia; oil seeds, etc., from India; salmon, dried cod, etc., from Canada; as well as a variety of commodities from Kenya and Uganda, Rhodesia, Ceylon, Cyprus, etc.

There will doubtless be general agreement with the statement that "the friendly atmosphere which has for so long surrounded British-Italian trade will no doubt play no small part in paving the way towards a resumption of normal business at the earliest possible date".

Laycock Engineering Company

Until recently the use of the Niagara One-gun High Pressure Washing Plant of the Laycock Engineering Co., and also their Two, Four, and Six-gun models, was confined to washing private cars, commercial vehicles, locomotives, etc., but the Marmite Food Co. have one of these Niagara plants installed which they use for cleaning out their Filter Presses.

As the Niagara will take slightly acid or alkaline solution in hot water without damage to its cylinders or other parts, it would appear to be a very valuable adjunct in any factory where food products are being manufactured, and where containers and other plant must be efficiently cleaned out at regular intervals. With its powerful straight-line jet delivered at a pressure of 375 lb. per square inch the Niagara makes short work of cleaning out crevices, and a twist of the wrist converts the straight-line jet to a fine spray or to a broad jet suitable for a final flush down.

The Niagara is extraordinarily economical in its use of water, and it is for this reason that it has been installed by so many garages throughout the British Empire and abroad. It is, we believe, the most popular and widely known high-pressure washing plant in the world, and any manufacturer of food products, in addition to employing it upon his manufacturing plant, will find it a great time, labour, and water saver when washing his trucks or vans.

New Preservative for Fruit and Vegetables

In an interview with Mr. A. Ryner, a director of the recently formed company, Preservators, Ltd., we were informed that they will shortly be manufacturing at a works at Fairfield, Bucks, a wrapping paper for the preservation of fruit and vegetables without resort to refrigeration.

The paper is impregnated with a neutralising agent which diffuses into the ambient air surrounding the fruit, changing the *p*H value from 0·4 to 0·7, under which conditions the growth of mildew and moulds is inhibited. The biological development of the fruit is of course not retarded. The paper may be laid over layers of fruit, or the fruit may be wrapped.

Plant will shortly be installed for treating and drying the paper, the method of production being of German development, this company holding the rights for the British Empire under patents. Peas, strawberries, pears, apples, and bananas have been successfully treated in Germany.

The treated paper is stated to be comparatively inexpensive.

"Food Manufacturing Equipment"

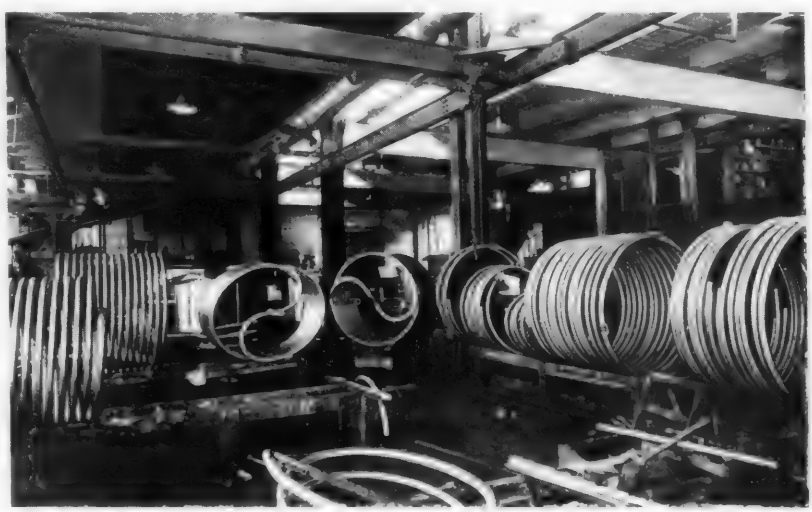
The fourth part of this alphabetical reference book concerning the uses of Monel Metal, Nickel, and Inconel in the manufacture of foodstuffs has now been issued by Henry Wiggin and Co., Ltd., and covers information P for Peas to S for Sausage-Linking Machines.

A large variety of subjects is dealt with and numerous illustrations appear throughout the issue, which runs from pages 49 to 64 inclusive. When the volume is complete it will provide a useful guide which many manufacturers will doubtless consider worthy of binding for future reference.

Election Success

In the recent Municipal Election Mr. Thomas Cecil Locker, M.Sc., M.Com., A.M.I.Mech.E., A.C.I.S., the Managing Director of Thomas Locker and Co., Ltd., Screening Engineers, Warrington, was elected to represent St. Austin's Ward on the Warrington Town Council.

Mr. Locker comes of a Warrington family who have given distinguished service to the town, Mr. Locker's father, the late Alderman J. T. Locker, being three times Mayor of Warrington, and Mr. Thomas Locker, a present Director of the firm, and uncle to Mr. T. C. Locker, for many years occupied the local Aldermanic Bench.



Coiled welded Inconel tubing as supplied by Metal Forming Corp., Elkart, Indiana, being made into finished pasteuriser and buttermilk machine coils for Jensen Creamery Machining Co.'s plant, Bloomfield, N.J., U.S.A. (With acknowledgments to Henry Wiggin and Company, Limited.)

A "Short and Mason" Development

An extension to the existing factory of Short and Mason, Ltd., at Walthamstow has recently been completed. It comprises two new bays designed on modern lines with saw top roofs giving ideal north light illumination. The end new bay is at present entirely devoted to offices, with latest equipment and appliances; although every department has more than enough room for present requirements, there is still a large amount of space available for expansion, and the original office space has been absorbed into the new factory plan and layout.

New Trollies for the Food Industry

G. H. Bartlett and Co. have recently introduced a new type of trolley which should be of considerable interest to the Food Industry.

It is built throughout of metal and has a fore and aft tip which adds considerably to the ease with which goods can be handled. The two large wheels in the centre of the trolley are ball-bearing, as are also the two smaller ones which are set at each end. The company state that the trolley enables 4 to 5 cwt. to be moved with great ease.

The number of trays on the trolley can be arranged to suit the containers. The trays are supplied by the company's own woodworking branch and can be obtained with perforated zinc banks which help air circulation and ventilation around the goods or, if preferred, with metal backs. The tray divisions are of plywood.

Red Reading Mercury

The Palmer Co., of Cincinnati, Ohio, U.S.A., have brought forward a new invention in thermometry, which they state greatly improves the ease with which the height of mercury can be read.

The Palmer "Red Reading Mercury" glass colours the mercury column red instead of the regular silver mercury. This is accomplished by means of reflection. Mercury is a natural mirror, so that by placing a strip of red or coloured glass to the side of the bore or reading column, and by having this bore turned to a slant, the red glass is reflected on to the mercury column, and when visioned through the lens in front of the tube only the red colour is seen.

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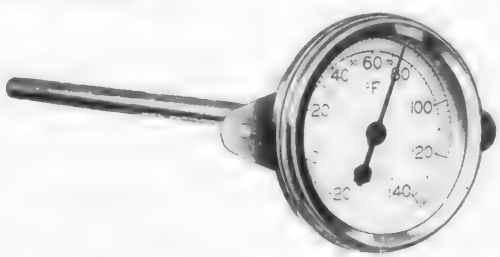
W. J. Bush and Co., Ltd., announce that Dr. P. C. C. Isherwood, O.B.E., Ph.D., F.I.C, who has been a director of the company since 1915, has been appointed joint managing director of the company.

Northern Inventors Committee

To encourage Northern inventors and help in exploitation of their patents, a Northern Inventions Committee has been established with headquarters in Newcastle-upon-Tyne. Councillor R. S. Dalgliesh (ex-Lord Mayor of Newcastle) is chairman, with Viscount Ridley (chairman, North-East Development Committee), the Lord Mayor of Newcastle (Alderman W. Locke), Mr. C. Forbes Adam (District Commissioner for the Special Area), Mr. V. Ewart Berry (Director, Newcastle Chronicle, Ltd.), Sir Arthur Lambert (a former Lord Mayor of Newcastle), Mr. R. J. Walker (chairman of directors, Parsons Marine Turbine Co., Ltd.), Captain Drury Coleman (Secretary, Institute of Patentees), and Mr. C. N. Reid (News Editor, *Newcastle Chronicle* publications).

D.M. Boiler Enamel

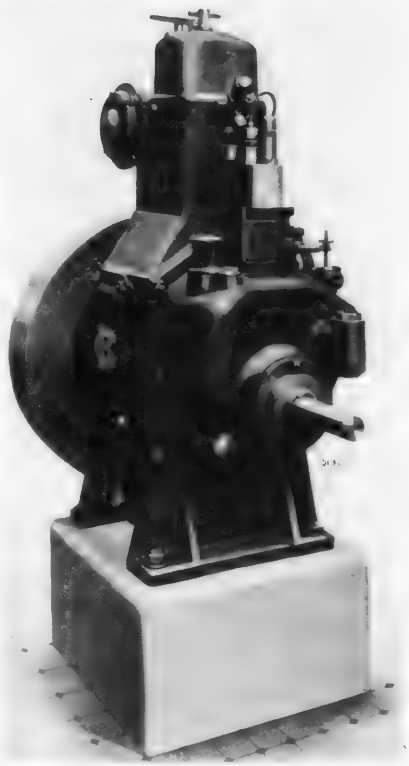
D.M. boiler enamel, manufactured by Houseman and Thompson, Ltd., Exchange Buildings, Newcastle-upon-Tyne, is a liquid which is fed into boilers with the feed water. Its action is to place a film round all particles of scale-forming matter which renders it impossible for them to adhere together, so that they fall to the bottom as mud. The same film or enamel forms upon all surfaces in contact with the water, and is a protection against pitting and corrosion. The steam given off is pure, and this product is largely used by brewers, dairies, hotels, and cooked food manufacturers, as well as in a number of hospitals and institutions.



A Light Immersion Rototherm Dial Thermometer specially suitable for works use for taking the temperature of liquids, etc. The normal range is from 20° to 140° F., but other ranges are obtainable on request. A paragraph on the Rototherm Dial Thermometer appeared on page 362 of our October issue.

Aluminium Milk Bottle Caps

It is reported that, by the end of the year, all the bottles used by the United Dairies, Ltd., will be aluminium-capped instead of possessing cardboard discs. The change-over calls for a new kind of bottle.



The Small Crossley High-speed Vertical Diesel Engine. Engines of 6, 8 and 10 h.p. are made in this type of speed 1,000 r.p.m. This engine is self-contained and its very simple design makes it suitable for any purposes for which a small engine can be used. It is light in weight and requires very little floor space.

Vertical Heavy Oil Engines

The extreme dependability and economy of "Fielding" Vertical Heavy Oil Engines are rapidly becoming recognised in the major industries, and in recent months several have been shipped to South Africa and Australia for operation in the gold mines, and excellent reports have been received of their efficiency and reliability.

These vertical engines are a development of the well-known "Fielding" horizontal engines and, similarly, work at quite low pressures. They incorporate the Fielding Patent Combustion Chamber, which contributes largely to their smooth running under steady or fluctuating loads. Fuel and lubricating oil consumption is remarkably low, and running is silent under all conditions.

Specifications of these engines are obtainable from the manufacturers: Fielding and Platt, Ltd., Gloucester.

This illustration shows one of the outstanding developments of the Cambridge Instrument Company, and it solves in a very effective manner the problem of reading temperatures from a considerable distance. The indicator can be applied to the measurement of temperatures by means of thermocouples or electrical distance thermometers, whilst it is also adaptable for indicating other conditions such as draught or pressure.

"Colosyl" Degreasants

Continued experiments with colloidal emulsifiers are understood to have resulted in a series of degreasants—named "Colosyl" by the makers—which meet the needs of the engineer in a way not previously contemplated. They are rapid and thorough in action, harmless to man, and extremely cheap to prepare.

Railways, shipping companies, gas and electric undertakings, government departments, and an increasing number of engineering shops are now using these Colosyl Brand Degreasants, which are supplied in crystalline form, easily stored, ready for simple preparation in solution with hot water.

We are informed by the manufacturers, Industrial Colloids, Ltd., of Altrincham Bridge, Manchester, that they are prepared to advise special forms of Colosyl Brand Degreasants for individual requirement.

Alcohol from Rice

As a result of the possibility of oil sanctions Italy is to try to extract alcohol from wine, rice, and lignite for the use of her aeroplanes and motor-cars.

Signor Mussolini is understood to have recently demonstrated the use of "denatured alcohol" as a motor fuel when he drove to the Argentina Theatre in Rome in a car on the spare tyre cover of which was printed in white paint the words "denatured alcohol".

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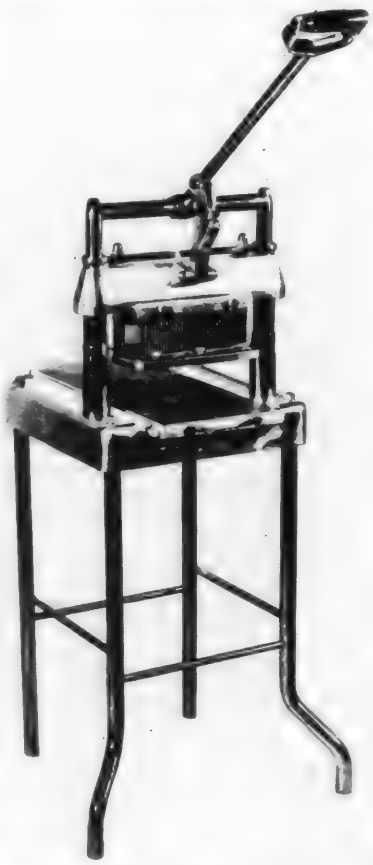
The Halley Motor Works at Yoker, Glasgow, have been acquired by Messrs. Albion Motors, Ltd., for extension purposes. They, in turn, have sold the goodwill of the former business to George Cohen, Sons and Co., Ltd., the well-known Engineers and Machinery Merchants.

New Meat Perfector

A new machine known as a Meat Perfector, for improving the tenderness of meat, is shortly to be manufactured in this country. Many thousands of these machines have been sold on the Continent, and it is claimed that its use in this country will prove of great value in improving the sales of the relatively tough portions of meat obtained from the forequarter.

By the simplest of operations the machine is said to make tender the toughest meat. A battery of fine points penetrate the joint or steak to be treated and break up the connective tissues, cut the sinews, and distend the fibre. The meat juices and appearance are, however, retained.



The new Meat Perfector which is being manufactured and marketed by Molcorn Ltd.

Its use is also recommended for meats prior to salting, as it ensures a rapid distribution of the brining ingredients throughout the meat, resulting in an even pink colour on boiling.

A new company to manufacture and market this machine has been registered as Molcorn (The Meat Perfector), Ltd., 10, Charterhouse Street, London, E.C. 1.

Vapour Vacuum Sealing

Among the important developments in the packaging of food products is that of vapour vacuum sealing mayonnaise and mayonnaise products, such as salad dressing, sandwich spreads, French dressings, etc. Prior to the development of vapour vacuum sealing, it was not possible to package these products, with the exception of French dressing, under vacuum, because the consistency of the product itself was so light and contained such a great volume of air.

With the advent of vapour vacuum sealing and the removal of 90 per cent. of the air from the head space of the package, oxidation was practically eliminated, as was the accustomed discoloration and rancidity on the surface of the product.

Vapour vacuum sealing with Whitecaps, made by the White Cap Co., U.S.A., is said to not only convey the advantages of perfect packaging to the consumer, but to furnish her with an hermetic re-seal.

The Liverpool Refrigeration Co., Ltd.

As from January 1, 1936, the headquarters of the Liverpool Refrigeration Co., Ltd., will be transferred from Colonial House, Liverpool, to "Polar Works", Sankey, Warrington. The telephone number is Penketh 80, and the telegraphic address, "Polar, Warrington".

For the convenience of clients, offices will be retained at Colonial House under the charge of Mr. W. G. Brettell, director of the company.

Government Publications

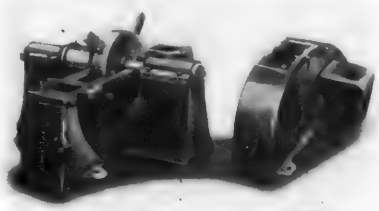
The monthly list of Government Publications for October mentions the following of interest to food manufacturers:

"Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1934."

"Aluminium in Food."

"The Manufacture of Sugar Regulations."

"Grade Designations and Grade Designation Marks for Dressed Poultry."



The I.C. Grinder designed for grinding and screening by International Combustion, Limited. Granular products can be made by this machine.

INFORMATION and ADVICE

A Foaming Drink—Preservatives—Diabetic Flour—Musty Odour —Sausage Rusk—Identification of Fats—Turkish Delight

A Foaming Drink

1,953. *I shall feel obliged if you will furnish me with a formula for a cold foaming drink.* (Scotland.)

Depending on the class of drink desired one would use citric or tartaric acid, bicarbonate of soda, castor sugar (with or without saccharine), white saponin, essence of lemon (or a powdered preparation especially for the purpose) and lemon yellow colour. Examples of two types of formulæ for the lemon type are as follows:

I

Citric acid (fine granular)	300
Bicarbonate of soda	180
White saponin	2
Essence of lemon	18
Lemon yellow colour .. .	1
Castor sugar	1,330

II

Sugar	53
Tartaric acid	27
Bicarbonate of soda	20
Saccharin	0·5
Mucilage of gum	2·0
"Drydex" lemon	1·5
Saponin	0·04
Liquid lemon yellow colour ..	0·25

Preservatives

1,954. *We thank you for information supplied on Bread Spreads. May we trouble you once more? Could you tell us what preservatives to use for a liquid substance composed of vegetable oil, milk, and eggs, and the quantity we should use per gallon in order to keep it for about three days?* (England.)

It seems to us that you could not use any added chemical preservative for this purpose, but you will have to rely on such factors as the freshness of the raw materials and their freedom from contamination of any kind, the freedom of the oil from any tendency to rancidity, low moisture content, high sugar content, and the cleanliness and efficiency of the seal of the container.

This is, of course, speaking only in very general terms, as before one could advise any definite procedure it would be necessary to have full details of the composition of the product and the processing which you have adopted.

Diabetic Flour

1,955. *The information you have sent is quite interesting, but at the same time it is not quite what I required. I wanted a good recipe for a diabetic* flour, *not bread, to place on the market to sell wholesale.*

I note in your letter that bran is incapable of digestion in the human intestine; now this is very interesting, and I should be very pleased if you can let me know whether this is correct. (England.)

We have made some enquiries among our friends, including the Research Association of British Flour Millers, and although there is information available on the preparation of gluten bread, there appears to be nothing useful on the preparation of the flour base. It would seem that the basis of such a flour is dried gluten prepared by washing out the starch in the ordinary way.

The difficulty is to find out what is mixed with this dried and ground gluten. We see that in some cases soya flour has been suggested, and, in another case, vegetables, spices, etc.

Such being the case, we would suggest that your best plan would be to see if you can get some practical suggestions from the soya flour people and also from the suppliers of gluten.

As regards the digestibility of bran, you should seek the opinion of some specialist on nutrition. We are hardly in a position to do anything more than quote other people's opinions, and it is better that you should obtain these first hand.

Musty Odour

1,956. [*Particulars were given of the composition, etc., of a proprietary food which develops a musty odour not long after packing in tins with a paper liner.*] (England.)

It is difficult without examining your product rather carefully to make any useful suggestions.

The musty odour may arise from initial rancidity of the fat constituents of the mixture, and it is well known that if these come into contact with metal the speed of rancidity is promoted.

Of course, if you use a paper lining which permits any greasy matter to penetrate through to the tin this would have some effect. It would accordingly, from this point of view, be worth experimenting with vegetable parchment or waxed paper lining.

Exposure to air and moisture, especially as the material is in contact with galvanised metal during initial storage in the bins, would promote rancidity and allow the entry of mould spores which might later develop in the containers, especially if the weather had been sufficiently moist to permit absorption of moisture by certain of the constituents, such as dried milk and malt flour. Another test worth making to ascertain if it effects an improvement would be to pack the material in vacuum containers.

Sausage Rusk

1,959. *We wish to obtain a suitable formula for the manufacture of sausage rusk and shall be glad to have some suitable information.* (England.)

A full account was given in the August issue of this journal.

1,961. *I wonder if you could give me references to any information which you have published on the packing of chicken, meat pastes, etc.* (Yorks.)

We would refer you to the article which appeared in the April, 1932, issue on this subject, which should be of assistance to you.

1,963. *What is the method of manufacture of citrus and of apple pectin?* (New Zealand.)

Some information was published in the May, 1932, issue.

1,964. *We shall be pleased if you can let us have any details regarding the manufacture of tomato purée from raw tomatoes.*

We should like to know the general principles involved and any details you can give us regarding the necessity for preservative, if any, and also any snags that are likely to occur in manufacture. (Ireland.)

See the article on this subject in the October, 1932, issue.

1,966. *We would be glad if you could give us any information on the extraction of blood from meat without the use of pressure.* (Ireland.)

The question is not clear. The amount of blood in meat is extremely small and that is mainly in the capillaries. If it is the soluble proteins you want, then pressure is as good as anything. The meat should first be minced and it would also help if it was first frozen.

1,967. *We are forwarding you, under separate cover, some samples of coated fruit jellies. We shall be glad if you will furnish us with a formula of the coating, and the method of manufacture.* (England.)

This was dealt with.

Identification of Fats

1,968. *I am enclosing herewith a small sample of a mixture of fats, the composition of which I know for certain contains 70 per cent. stearic acid, but the remaining 30 per cent. I cannot find out what it is; of this 30 per cent., approximately 70 per cent. of it is unsaponifiable and gives an iodine value of 30.*

Now this sample, I am sure, need not be assayed, for it is too small, and the odour is quite characteristic, and I think if you can identify this odour for me I have the solution of the whole problem, for this belongs to this unsaponifiable portion—which is very soft and greasy—much softer than vaseline or petroleum jelly. It is definitely not the latter, however, and I may state that I thought same was lanolin, but the unsaponifiable portion of lanolin is quite firm and hard and tacky, in contrast to the unsaponifiable portion of sample. So that, without any analysing, I am sure that it should be recognised by its odour alone without anything further being done.

I have tried to obtain and duplicate this odour out here, but have not succeeded. I know also definitely that this substance is bought on the English market in large quantities, and is quite cheap.

I gladly need your co-operation in this matter, and if you cannot recognise same, could you forward it on to a chemist whom you might think would recognise it, and if he requires further samples, I would immediately forward a sample of the unsaponifiable portion if desired; but, as I said before, it should be immediately recognised by its odour, which I cannot emphasise enough. (Australia.)

This sample was passed on to a chemist.

Turkish Delight

1,969. *As a subscriber to* FOOD MANUFACTURE, *I shall be glad if you will let me have recipes with which to experiment in the production of good quality Turkish Delight.* (Herts.)

We are quoting some information regarding the manufacture of Turkish Delight from Scarborough's book *Sweet Manufacture*:

Crystal sugar	60 lb.
Cornflour (good quality)	20 ,,
Icing sugar	20 ,,
Cream of tartar	⅜ oz.

Boil the crystal sugar with the cream of tartar in the usual way to 260° F. Cream the cornflour in 20 lb. of cold water and add together with the icing sugar. Cook slowly until the required set is obtained, usually at 225° F. Add the necessary colours and flavours, and, if desired, a small quantity of tartaric acid. Pour into wet tins or well-starched wooden boxes to cool. Cut and dust in icing sugar. The icing sugar in the recipe may be replaced with glucose if desired, using about 100 per cent. more. In this case the cream of tartar should be omitted, and the glucose must be boiled with the crystal sugar instead of being added afterwards.

1,970. *I have a troublesome problem before me in the manufacture of marzipan, which has a most unpleasant smell from the egg albumen that I use. I should like your advice on the matter.* (England.)

We are afraid that we cannot understand how you should be getting any objectionable results if you use good quality egg albumen. In any case, it is really not essential to use this product in marzipan.

However, we would say that your best plan would be to submit a sample of the marzipan and albumen to a consulting food technologist for his opinion.

Information was furnished to the following enquirers:

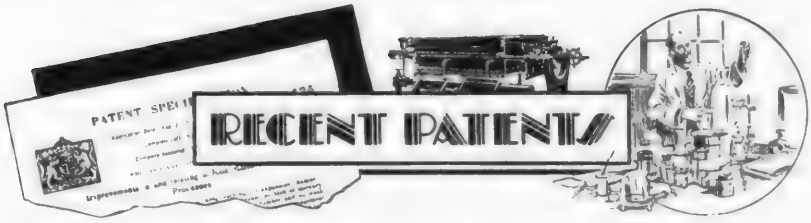
1,957. *Kindly furnish particulars of the manufacture of custard powders.* (England.)

1,958. *Please supply instructions on making of coconut macaroons without using egg whites or their substitutes.* (Kent.)

1,960. *Please give names of the most important importers of olive oil.* (England.)

1,962. *Kindly supply recipe for the manufacture of horse-radish cream.* (London.)

1,965. *We should be pleased to receive a copy of the replies sent to enquiriers 1,834 and 1,837 in the April issue.* (Australia.)



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

30546. NUTTALL, S. J., and NUTTALL, W.: Sweetmeats. November 5.
31017. FREDLANDER, M.: Sauces, etc. November 9.
31183. ROGERS, L. H. (NAME CORPORATION): Method of food marking. November 11.
31383. BESSO, R.: Devices for facilitating the extraction of juice from oranges, etc. November 13.
31485. TOWNSEND, C. S.: Manufacture of foods. November 14.
31690. CHRISTENSEN, C. H.: Preparation of food products from barley, etc. November 15.
32274. KALLMANN, A.: Process for obtaining caffeine-free coffee. November 21.
32457. FRINGS, H.: Production of vinegar. November 22.
32666. HADDAN, R. (WESTERN STATES MACHINE CO.): Process of refining sugar. November 25.
32730. BOTTOMLEY, F., and ROBERTS, T. F.: Manufacture of confectionery. November 26.
32751. HIRSCH, P.: Production of pectin. November 26. (Germany, November 26, 1934.)
32876. HUTCHESON, W. W., and MASON, W. C.: Production of whey, etc., liquids in powder form. November 27.
32910 and 32911. BRITISH HAVACONE CO., LTD., and MARSHALL, E. L.: Manufacture of ice-cream cones. November 27.
33351. BURGESS, A. F. (KRAFT-PHENIX CHEESE CORPORATION): Treatment of cheese. December 2.
33654. NAAMLOOZE VENNOOTSCHAP INDUSTRIEELE MAATSCHAPPIJ VOORHEEN NOURY AND VAN DER LANDE: Manufacture, etc., of flour. December 4.
33655, 33656. NAAMLOOZE VENNOOTSCHAP INDUSTRIEELE MAATSCHAPPIJ VOORHEEN NOURY AND VAN DER LANDE: Manufacture, etc., of flour. December 4. (Cognate with 33654.)

Complete Specifications Accepted

437,492. CHAPPEL BROS., INC.: Process of producing a readily digested meat-protein preparation.
437,495. MOLLER, G., and PETERSON, P.: Method and apparatus for preserving eggs, meat, fish, vegetables, or other victuals by means of carbonic acid or another indifferent gas.
437,683. SARDIK, INC.: Pectin and its manufacture.
437,737. PROCTOR AND GAMBLE CO.: Manufacture of bakery products. (October 16, 1933.)
437,859. ASSER, E.: Production of stable lecithin emulsions. (February 7, 1934.)
437,893. BINGHAM, G. C.: Machine for grading eggs.
437,898. GRIFFITH LABORATORIES, INC.: Curing-salt. (May 8, 1933.) (Cognate Application 14443/34.)
438,056. FAWCETT, E. W., and IMPERIAL CHEMICAL INDUSTRIES, LTD.: Process of refining crude fats and fatty oils.
438,072. SMITH, H. H.: Beverage food.
438,146. TARBET, W. G., and ALUMINIUM PLANT AND VESSEL CO., LTD.: Pasteurisation, sterilisation, or like treatment of milk and other liquids.
438,184. EBNER, O.: Apparatus for the production of extracts from coffee and tea. (January 26, 1935.)
438,233. STANDARD BRANDS, INC.: Process of and apparatus for canning eggs. (February 13, 1934.)
438,244. INTERNATIONAL PATENTS DEVELOPMENT CO.: Crystallisation of dextrose.
438,280. POULTNEY, S. V.: Manufacture of extracts or essences of coffee, chicory, cocoa, and the like beverages. (Cognate application 5600/35.)
438,349. WARD, J. F.: Production of fish-liver oils, particularly halibut-liver oil.
438,509. SOC. DE CREDITS INTERNATIONAUX SOC. ANON.: Production of a food.
438,529. HENKEL AND CIE, GES.: Process for the manufacture of crustless cheese.
438,713. ALEXANDERWERKE A. VON. DER NAHMER AKT.-GES.: Slicing machines for vegetables, fruit, or the like. (April 11, 1935.)
438,726. CLOUD, W. S.: Methods and apparatus for coating confections.
439,017. MERKEL, H.: Method and means for making coffee infusions more digestible.
439,141. DEUTSCHE STAERKE-VERKAUFS-GEN. EINGETRAGENE GEN.: Manufacture of sweetstuffs. (March 15, 1934.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

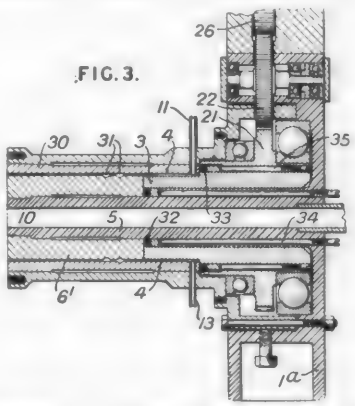
433,242. **Canning salmon.** HOPKINSON, L. T., 3509, Livingstone Street, Washington, U.S.A.

In preparing salmon, particularly of low grade, for food by cleaning from inedible waste and packing the edible portion in cans or other containers which are subsequently sealed, free water is removed from the salmon and salmon oil is added thereto. The fish is cleaned and the edible portion cooked, and the backbone and skin are removed and the liquid separated. The oil is extracted from this liquid and added to the containers, to which also are added the cooked salmon meat and salmon oil extracted from the heads, fins, entrails, and other waste portions. Common salt or other seasoning is next added, and the cans are sealed and heated to above the boiling point for about ninety minutes to sterilise and complete the cooking of the salmon. The waste products are treated to obtain the oil by boiling in a vat until substantially all the oil has passed into the liquid, separating the liquid from the solids—*e.g.*, by a filter press—and extracting the oil from the liquid by centrifuging, heating, decanting, etc., and clarifying it by further heating or filtering or both. The solid residue is dried to give a press cake, which may be used as a fertiliser or a food for poultry and cattle. Oil obtained from salmon of one grade may be added to salmon of another grade. The free water may be removed from the fish by methods other than cooking—*e.g.*, by salting or by evaporation by exposure to the atmosphere in shallow trays.

433,245. GROUP V. **Extruding sausage casings.** BECKER, O. W., Weinheim, Baden, Germany.

In the extrusion of sausage casings from a plastic kneadable mash of animal or vegetable substances the fibres of the mash are orientated in the annular die to give maximum strength to the casing, by means which impart a rotary movement to the material in the die. As shown, the mash is fed, under pressure, to the annular die space 4 by a number of tangentially arranged tubes 11, 13 spaced circumferentially, and the rotation of the material is effected by the rotation of a

FIG. 3.



portion 3 of the die, which is driven by gears, 26, 22, 21. The rotation is in the same direction as the tangential feed of the materal. In the part of the die influenced by the rotary part 3 the fibres become orientated in transverse or circumferential directions. The fibres at the surfaces of the casing are re-orientated in longitudinal or axial directions, to pro-

duce an interlocking of the fibres, by arranging a stationary bush 6[1] in front of the part 3 to form a stationary nozzle. Circumferential grooves 31 in the bush 6[1] or in the bush 30, or in both, allow the material to accumulate therein to increase the friction, this effecting an additional re-orientation of the fibres. Air is blown through the bore 10 to inflate the extruded casing. The packings 32, 33 are adjustable by screws 34, 35. The inner core 5 on which the part 3 rotates is integral with the frame 1[a].

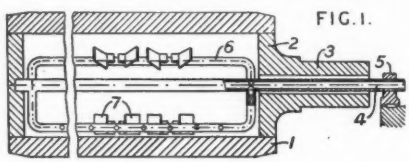
434,058. **Whey.** TRIGGS, W. W., 57, Lincoln's Inn Fields, London (Kraft-Phenix Cheese Corporation, 400, Rush Street, Chicago, U.S.A.).
Whey is concentrated to give a product having a high vitamin G content by evaporating it at a *p*H value of not higher than 6 and not below about 5·5. In an example phosphoric acid is added to the whey to give the desired *p*H value prior or subsequent to its introduction into a vacuum pan, in which it is then evaporated to a point at which it will set on cooling. While it is still hot the free phosphoric acid is preferably neutralised by adding lime. After the whey has cooled and set it is subdivided and drying is completed in a drying tunnel at a temperature sufficiently low to avoid carmelisation of the sugar, giving a substantially dry, non-hygroscopic product. Where the whey used is a by-product in the manufacture of casein by precipitation with hydrochloric acid, further addition of acid may not be necessary, or an excess of acid may be present and may be removed by neutralising with soda or magnesia or by treating in an electrolytic cell or cells. The whey used may also have sufficient lactic acid present to give the desired *p*H value. The reduction in the *p*H value reduces foaming during concentration of the whey in the vacuum pan.

434,137. **Preservation of fruit.** HINRICHS, W. J. H., Maienweg 43, Hamburg, Germany.
Ordinary latex solutions contain albumen and other unstable substances which are detrimental to fruit. Complete air exclusion, following enclosure of fruit in a latex covering, is also undesirable. To overcome these drawbacks it is now proposed to use a latex thickened to about 60 per cent. (*e.g.*, by centrifuging) and washed with ammoniated water to remove hygroscopic substances. The so treated latex is diluted with water (not distilled water) to a 30 to 50 per cent. concentration, according to the character of the fruit under treatment. Before use as a fruit-dipping solution a preservative should preferably be incorporated. Tropical fruits (*e.g.*, banana bunches) coated with such a solution after picking can be transported in ordinary containers without cooling precautions. Owing to the subsequent water addition to the purified latex, sufficient air inflow through the film is ensured. Smaller fruit (such as apples, lemons, grapefruit, and melons) are laid immediately after picking upon a travelling wire sieve or band, which is led through the latex solution. After drying, the fruits are carefully removed from the conveyor and wrapped in paper before final packing.

434,137. **Preserving fruit.** HINRICHS, W. J. H., 43, Maienweg, Hamburg, Germany.
Fruit is preserved by applying an air permeable coating consisting of rubber latex which has first been concentrated—*e.g.*, to 60 per cent.—by repeated centrifuging and washed free from hygroscopic constituents—*e.g.*, by means of water containing ammonia—and then diluted with water other than distilled water to about 35 to 50 per cent. A preserving agent such as salicylic or boric acid may be added to the latex.

434,344. GROUP XIII. **Hollow rollers.** LEHMANN, F. B., trading as Lehmann, J. M. (firm of), 108, Freiberger Strasse, Dresden, Germany.
In a water-cooled hollow roller for grinding cocoa, etc., having an internal cooling water delivery device for distributing cooling water evenly along the length of the roller and stationary water-damming and mixing means, the cooling water delivery device is arranged to function also as the

FIG. 1.



damming and mixing means, and includes cooling water delivery pipes located in the path of the centrifugal water ring within the roller and connected to a common inlet. As shown, the roller shell 1 is provided with an end wall 2, which may be pressed into the shell and carries the trunnion 3. A pipe 4, held in a bracket 5, extends through the trunnion and is supported in the opposite end wall. Branch pipes 6 are connected to the pipe 4 and carry baffles 7, which break up the flow of water carried round by the roller. The pipes 6 are provided with inclined perforations through which water is projected on to the roller surface. The pipes 6 may be of waved shape.

435,034. **Degraded starch preparations.** ALLGÄUER ALPENMILCH A.-G., Biessenhoten, Bavaria.
Degradation of starch to dextrine and maltose is claimed to proceed advantageously in the presence of a mixture of ferments from *Aspergillus oryzæ* cultivated in a suitable nutritive medium. Such a mixture is reported to act not only upon the starch enclosed in the starch grain, but also upon the enveloping amylopectin, the valuable phosphorus compounds of the latter thus being rendered available in foodstuffs. The process can be operated with potato starch or wheat, oats, or cereal starch. The raw material is suspended in water and the suspension adjusted to a *p*H of 5 by means of crystalline citric acid. The mixture of ferments from *Aspergillus oryzæ* is then incorporated and the mixture transferred to hot water and stirred at a temperature of 65° C. until breakdown to a mixture of equal parts dextrine and maltose has proceeded to a sufficient extent. To avoid any further enzyme action, the ferments are destroyed by heating to 80° C. Finally, the hot turbid sugar solution is filtered through a press and evaporated in a vacuum to form a brittle mass, which is ground to fine powder. (Convention dates, Germany, March 7, 1933, and July 25, 1933.)

436,116. **Coffee substitutes from cereals.** JALOWETZ, E., and HAMBURG, M., Währingstr. 22, Vienna IX.
Malt coffee is usually prepared from three- to six-days-old green barley malt or from moistened cured malt by maintaining in a roasting drum at 70° C. (in order to bring about partial conversion of the contents of the grain into dextrine and maltose) before proceeding to the actual roasting. This method involves the drawback that the whole of the starch is not converted into a paste, thus preventing uniform roasting, and a large proportion of the grains are found to be imperfectly roasted. Furthermore, by preheating at 70° C., water or condensation products collect in the drum even with thorough ventilation. The process of the present invention is claimed to result in a uniformly roasted, full-grained, highly aromatic coffee substitute from unmalted grain or grain malted at any stage of germination. The process involves preliminary steeping in water for up to ninety-six hours (with aeration if desired). An enzymatic process is thereby set up, leading to solubilisation of the unpleasant-tasting husk proteins and their elimination to a considerable extent. The steeped material is afterwards heated in a steam current in any suitable apparatus such as revolving sieves until the interior of the grain reaches a temperature at which the enzymes bring about further dextrinisation, followed by complete impasting of any still unaltered starch. By using drum sieves or the like, the objectionable condensed water is able to escape. This steaming process is claimed to result in more uniform saccharification and decomposition. After treating in this manner for about thirty minutes the product is passed to the roasting drum, where roasting is commenced at such a high initial temperature that no water condensation takes place. Water in the grain interior is thus relatively rapidly vaporised and the grains are puffed out. (Convention date, Austria, January 11, 1934.)

436,855. **Improved meat-cooking process.** SWIFT AND CO., Union Stockyards, Chicago, Illinois, U.S.A.
Hams and other meat products are rendered exceptionally tender and acquire unusual flavour by exposing to relatively high temperature in a humid atmosphere and then cooking at a lower temperature for a relatively long time in a humid atmosphere. The total cooking period (ranging from fourteen to twenty-four hours in the case of hams) is about twice as long as customary. This thorough cooking under conditions avoiding desiccation is claimed to develop a unique and peculiarly desirable flavour, partly owing to release of gelatine, which forms a coating on the skin and surface of the ham, thereby sealing in the moisture and natural flavours. The process is also applicable to pork tongue, beef tongue, beef brisket, etc. (Convention date, U.S.A., May 6, 1933.)

NEW COMPANIES

Fred. W. Amend and Co., Ltd. Broadwater Road, Welwyn Garden City, Herts. To carry on the bus. of mnfrs. of and dlrs. in the "Chuckles" brand of sweetmeats, etc. Nom. Cap.: £15,000. Dirs.: O. Baptist, 8, Sherrards Park Road, Welwyn Garden City (permt.); J. W. C. Bindley, 50, Sheffield Terrace, W.8 (permt.); D. Balfour-Murray, 37, Digswell Road, Welwyn Garden City.

Gold Medal Bakeries, Limited. To take over the bus. of bakers, etc., cd. on at Wolverhampton and Kentish Town by the trustees of the late W. T. Pearson. Nom. Cap.: £7,000. Permt. dirs.: J. L. Pearson-Fenn (mng. dir.) and Emilie U. Pearson-Fenn, both of 92, Wanderers Avenue, Wolverhampton; Sylvia M. Griffiths, 236, Dudley Road, Wolverhampton; and Beatrice E. Chesworth, 61, Weedington Road, N.W. 5.

H. A. Marwood and Company, Limited. 86, Melrose Road, Liverpool. To carry on the bus. of cooked meat mnfrs., etc. Nom. Cap.: £2,000. Dirs.: S. McKie, 30, Culme Road, West Derby, Liverpool; H. Hulme, 22, Corinthian Avenue, Stoneycroft, Liverpool; A. S. Colquhoun, 22, Stalbridge Avenue, Wavertree, Liverpool; and J. M. Pinkington, Studley, St. Anthony's Road, Blundellsands.

Hawley's Bakeries, Limited. 198, Moseley Road, Birmingham. To take over the bus. of bakers and confectioners cd. on at Moseley Road, Birmingham. Nom. Cap.: £18,000. Dirs.: A. Hawley, 343, Pershore Road, Edgbaston, Birmingham (permt. governing dir. and ch.); and A. T. Hawley, St. Ives, Goodby Road, Moseley, Birmingham.

Joseph Lingford and Son, Limited. 5, Durham Street, Bishop Auckland, Co. Durham. To carry on the bus. of producers, mnfrs. of and dlrs. in baking, gravy, egg-saving, and other powders, etc. Nom. Cap.: £20,000. Dirs.: H. M. Lingford, Lancelands, Cotherstone, Yorks (permt.); E. H. Taylor, Bishop Oak, Wolsingham, Co. Durham; and H. Wood, Corn Close, Barnard Castle.

Julians Estate, Limited. To carry on the bus. of agriculturists, farmers, etc. Nom. Cap.: £8,000. Dirs.: Emily M. Marchal, address not stated; E. J. M. G. Marchal, Emile C. M. L. Marchal, C. N. M. J. Marchal, and Marie E. P. E. Marchal, addresses not stated. Subs.: F. H. Hatton, Broad Street House, E.C. 2 (clk.); W. E. West, Broad Street House, E.C. 2 (clk.).

Letchworth Bacon Company, Limited. To carry on the bus. of slaughterers, bacon curers, etc. Nom. Cap.: £5,000. Dirs.: To be appointed by the subs. Subs.: H. G. Ings, 24, Basinghall Street, E.C. (accountant), and R. R. Smith, 7-8, New Hibernia Chambers, London Bridge, S.E. 1.

M.G. Farm, Limited. Manfield House, Southampton Street, Strand, W.C. 2. To carry on the bus. of cultivators of and dlrs. in mushrooms, etc. Nom. Cap.: £1,000. Dirs.: C. W. Collinson, 80, Parade Mansions, Hendon Central; J. Fortune, Abbotsbury, Church Drive, North Harrow.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

Trade Literature Received

pH Values

We have recently received a copy of the fourth revised and enlarged edition of the British Drug Houses, Ltd., booklet on "*p*H Values, What they are and how to determine them".

The booklet contains information on absolute neutrality, the *p*H scale, acidity, indicators, determination of *p*H values, the use of a comparator, the capillator method of *p*H determination, how to use the capillator, etc.

The booklet contains 24 pages, is well produced, and has a number of graphs and illustrations. The company will be pleased to supply a copy to any reader of FOOD MANUFACTURE on application to them.

Crofts (Engineers) Ltd.

We have received from Crofts (Engineers), Ltd., Thornbury, Bradford, a copy of their new Flexible Coupling catalogue, which is a handy little booklet listing types of flexible and other couplings to meet all general requirements and including ordinary flanged couplings, compression, universal, flexible, slipping, safety couplings, etc. The couplings listed are standardised in a wide range of sizes, so that this catalogue should be of considerable assistance to engineers and power users, as it enables them to select the type of coupling best suited to their particular requirements.

Sternolease

We have recently received from Sternol, Ltd., Royal London House, Finsbury Square, London, E.C. 2, a copy of their latest Sternolease folder card. It is well produced in blue and black, and has on the first page the slogan "Drives bolts off their 'nuts'."

Sternolease is for freeing nuts, bolts, studs, flanges, hinges, etc., for it penetrates rust and destroys corrosion. All that is necessary is to pour a few drops of the fluid on to the bolts, nuts, etc., to be released and the affected part can then be unscrewed after the Sternolease has had time to work through the corrosion. The company will be pleased to send a copy of the leaflet to anyone interested.

The Parker Pass-Out Engine

Ashworth and Parker, Ltd., Riverside Works, Bury, Lancs, have sent us a copy of their leaflet entitled "Pass-Out Steam Engines for Power and Economy". The company commenced building enclosed forced-lubrication Steam Engines in 1901, and were pioneers in the application of this system of working in many industries. They have consistently recommended its adoption for all cases where low-pressure steam was necessary for process work.

The leaflet contains a number of illustrations, including one showing a group of Four Triple-expansion Pass-out Steam Generating Sets for West of England Milk Factories.

Essential Oil Booklet

A. Boake, Roberts and Co., Ltd., Carpenters Road, Stratford, London, E. 15, have sent us a copy of the new issue of *Essential Oil Booklet* which they have issued in view of the very considerable interest shown in the previous issue, which is now out of print.

The booklet is very well produced, and contains a number of large graphs showing the prices which have obtained for various essential oils over a period. With the aid of these graphs one is able to extract both general impressions and details of importance which are much more difficult to extract from columns of figures alone.

In addition, there is a page containing photographs and a short description and history of the firm.

Copper Information

All the generalised information about copper, which the ordinary user is likely to need, has been collected and issued in the form of a convenient engineers' notebook by the Copper Development Association, Thames House, Millbank, London, S.W. 1, from whom copies can be obtained free of charge on application.

RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

A. L.—563,997. **Fruit syrups (not alcoholic) and cordials (not alcoholic).** HARRY KIRTLAND, trading as A. Lepetit, 35, Rupert Street, London, W. 1. December 11.

ARADALE. — 561,357. **Canned salmon.** FRANK FARRANDS, LTD., 108, Mansfield Road, Nottingham. November 27. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the device of a salmon cutlet.

BANJO.—563,748. **Bread for human consumption.** BURDETTS, LTD., Farmside Model Bakery, Farmside Place, Levershulme, Manchester. December 11. (Associated.)

BLACK KNIGHT. — 563,763. **Canned fruits.** SCHUCKL AND CO., INCORPORATED, 260, California Street, San Francisco, United States of America. December 11. (Associated.)

BRIDPORT LASS. — 564,013. **Canned cream produced in Bridport, Dorsetshire.** DEVON AND DORSET DAIRIES, LTD., 37 and 38, Fenchurch Street, London, E.C. 3. December 4.

CHOKRA.—562,789. **Canned meats, canned fish, canned fruits, and canned vegetables.** GOMEI KAISHA DOMOTO SHOKAI, 9, Kita Sumiya - cho, Minamike, Osaka, Japan. December 4.

COTSDALE.—555,070. **Cheese.** DOMINION DAIRY CO., LTD., Bicester Road, Aylesbury, Buckinghamshire. December 4. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the devices of cows and of pastoral scenes.

CUP. — 559,670. **Condensed milk and cream.** CLEEVES, LTD., Cleevedale Park, 44, South Side, Clapham Common, London, S.W. 4. November 27.

User claimed from December, 1923, Section 21.

DWARF. — B 559,883. **Peas for food.** BATCHELOR AND CO. (SHEFFIELD), LTD., Batchelor's Buildings, Stanley Street, Wicker, Sheffield. November 27.

User claimed from December 10, 1913.

The applicants undertake that this mark, when registered, and the marks Nos. 423,946 (2315), 489,321 (2618), 487,322 (2615), 487,671 (2612), and B 529,433 (2838), and any other marks associated therewith, shall be assigned or transmitted only as a whole and not separately.

FLASHLIGHT. — 563,968. **Meal for making rusks, for use in filling sausages.** WILLIAM SUTCLIFFE AND SON, LTD., Egerton Street Mills, Egerton Street, Hulme, Manchester. December 4.

FRIZCO. — 563,327. **Ice-cream and ice-cream powders.** HERBERT MUSCHAMP LINGFORD, trading as Joseph Lingford and Son, 5, Durham Street, Bishop Auckland, Durham. December 11. (By Consent.)

GOLDEN DELL. — 563,508. **Milk and cream.** GEORGE J. MASON, LTD., 68, Bradford Street, Birmingham, 5. November 27. (Associated.)

GRANARY. — 563,582. **Bread.** ENGLISH GRAINS CO., LTD., Shobnall Road, Burton-on-Trent. December 11. (Associated.)

KUANT. — 563,089. **Tea.** J. AND I. BATTEN AND CO., LTD., 24 and 25, Rood Lane, London, E.C. 3. December 11.

LUCKY BOY.—562,451. **Substances used as food or as ingredients in food, but not including honey and not including any goods of a like kind to honey.** MIDLAND COUNTIES DAIRY, LTD., Corner of Corporation Street and Bagot Street, Birmingham, 4. November 27. (Associated.)

MELKOG. — 564,136. **Preparations of cocoa, chocolate, honey, and cane sugar for mixing with milk to form a beverage.** ROSS'S DAIRIES, LTD., 572, Dumbarton Road, Partick, Glasgow, W. 1. December 11.

PARISETTE.—B 558,071. **Sardines.** The firm trading as ABECASSIS, IRMAOS AND CO., Largo do Municipio 32, Lisbon, Portugal. December 11.

User claimed from December 1, 1920.

PERFECT PARKIN.—B 560,736. **Parkin cakes for sale in Lancashire, Yorkshire, and Cheshire only.** P. PARKER AND SONS, LTD., 2, Needham Avenue, Chorlton-cum-Hardy, Manchester. November 27.

User claimed from the year 1925.

PROCEA.—563,300. **Gluten (for food).** PROCEA PRODUCTS, LTD., Copthall House, Copthall Avenue, London, S.E. 2. December 11. (Associated.)

SEACREST.—563,025. **Margarine.** BALLOCHMYLE CREAMERY CO., LTD., 4, Water Street, Tudor Street, London, E.C. 4. (Associated.) December 4.

WILLIE WHISTLER. — 563,918 **Chocolate, confectionery, biscuits, and sweets.** JOHN OLDHAM STOCKWELL, 37, Stoney Street, Nottingham. December 4.

Registration of this trade mark shall give no right to the exclusive use of the words "Willie Whistler".

560,402.—**Substances used as food or as ingredients in food, but not including tea, coffee, sauces, toffee, malt extract, malted wheat meal, bakers' raising powders, or flour, and not including any goods of a like kind to any of these excluded goods.** JOHN A. HUNTER AND CO., LTD., Broad Green Road, Liverpool, 14. December 11. (Associated.)

562,988. **Tea and coffee.** J. AND J. LONSDALE AND CO. (LONDON), LTD., Fennings Wharf, London Bridge, London, S.E. 1. December 11. (By Consent.)